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=> file reg
FILE 'REGISTRY' ENTERED AT 16:19:53 ON 24 JAN 2003
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     FILE 'REGISTRY' ENTERED AT 15:24:03 ON 24 JAN 2003
L1        236372 S 73-100 FE/MAC
L2        132285 S L1 AND CR/ELS
L3         86788 S L1 AND NI/ELS
L4         53149 S L1 AND CU/ELS
L5         86606 S L1 AND MO/ELS
L6        156016 S L1 AND C/ELS
L7         10569 S L2 AND L3 AND L4 AND L5 AND L6

     FILE 'HCA' ENTERED AT 15:29:41 ON 24 JAN 2003
L8         18329 S L7
L9         89032 S GRAIN#(2A)(MESH? OR SIZE# OR SIZING# OR DIA# OR DIAM# O
L10        22918 S ASTM
L11         2289 S .DELTA.(2A)FERRITE#
L12       152639 S TENSIL?(2A)(STRENGTH? OR STRONG?)
L13         8330 S CHARPY
L14        59010 S (TEMPER OR TEMPERS OR TEMPERRED OR TEMPERED OR TEMPERRI
L15           633 S L8 AND L9
L16           313 S L8 AND L10
L17           605 S ASTM(2A)5
L18             7 S L8 AND L17
L19            88 S L8 AND L11
L20          1655 S L8 AND L12
L21           461 S L8 AND L13
L22           826 S L8 AND L14
L23            26 S L15 AND L16
L24             7 S L15 AND L19
L25            73 S L15 AND L20
L26            31 S L15 AND L21
L27            50 S L15 AND L22
L28             3 S L16 AND L19
L29            34 S L16 AND L20
L30            34 S L16 AND L21
L31             8 S L16 AND L22
L32             9 S L19 AND L20
L33             2 S L19 AND L21
L34             3 S L19 AND L22
L35           110 S L20 AND L21
L36           122 S L20 AND L22
L37            27 S L21 AND L22
L38             7 S L23 AND L25
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L39             1 S L23 AND L26
L40             2 S L23 AND L27
L41             7 S L23 AND L29
L42             1 S L23 AND L30
L43             0 S L23 AND L35
L44             0 S L23 AND L36
L45             0 S L23 AND L37
L46             6 S L25 AND L26
L47             8 S L25 AND L27
L48             7 S L25 AND L29
L49             0 S L25 AND L30
L50             6 S L25 AND L35
L51             8 S L25 AND L36
L52             0 S L25 AND L37
L53             1 S L26 AND L27
L54             0 S L26 AND L29
L55             1 S L26 AND L30
L56             6 S L26 AND L35
L57             0 S L26 AND L36
L58             1 S L26 AND L37
L59             0 S L27 AND L29
L60             0 S L27 AND L30
L61             0 S L27 AND L35
L62             8 S L27 AND L36
L63             1 S L27 AND L37
L64             3 S L29 AND L30
L65             3 S L29 AND L35
L66             0 S L29 AND L36
L67             0 S L29 AND L37
L68             3 S L30 AND L35
L69             0 S L30 AND L36
L70             0 S L30 AND L37
L71             5 S L35 AND L36
L72             5 S L35 AND L37
L73             5 S L36 AND L37

     FILE 'REGISTRY' ENTERED AT 15:53:08 ON 24 JAN 2003
L74         27528 S L1 AND NB/ELS
L75          2021 S L2 AND L3 AND L4 AND L5 AND L6 AND L74

     FILE 'HCA' ENTERED AT 15:54:12 ON 24 JAN 2003
L76          3040 S L75
L77           144 S L76 AND L9
L78            96 S L76 AND L10
L79            38 S L76 AND L11
L80           356 S L76 AND L12
L81           113 S L76 AND L13
L82            96 S L76 AND L14
L83             0 S L77 AND L78 AND L79 AND L80 AND L81 AND L82
L84             7 S L77 AND L78
L85             3 S L77 AND L79
L86            29 S L77 AND L80
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L87           5 S L77 AND L81
L88           9 S L77 AND L82
L89           1 S L78 AND L79
L90           9 S L78 AND L80
L91          15 S L78 AND L81
L92           0 S L78 AND L82
L93           4 S L79 AND L80
L94           1 S L79 AND L81
L95           3 S L79 AND L82
L96          25 S L80 AND L81
L97          16 S L80 AND L82
L98           5 S L81 AND L82
L99           0 S L86 AND L91
L100          1 S L86 AND L96
L101          3 S L86 AND L97
L102          1 S L91 AND L96
L103          0 S L91 AND L97
L104          1 S L96 AND L97

     FILE 'REGISTRY' ENTERED AT 16:01:43 ON 24 JAN 2003
L105     292011 S 60-100 FE/MAC
L106      17628 S L105 AND 0.3-10 NB/MAC
L107     135124 S L105 AND 0.03-1.00 C/MAC
L108      53666 S L105 AND 0.25-1.25 MO/MAC
L109      17743 S L105 AND 1-2 CU/MAC
L110      14707 S L105 AND 5-8 NI/MAC
L111      45449 S L105 AND 12-18 CR/MAC
L112        106 S L106 AND L107 AND L108 AND L109 AND L110 AND L111

     FILE 'HCA' ENTERED AT 16:06:16 ON 24 JAN 2003
L113        148 S L112
L114     623762 S STEEL?
L115     141542 S STAINLESS?
L116        139 S L113 AND L114
L117        102 S L116 AND L115
L118          3 S L117 AND L9
L119          1 S L117 AND L10
L120          2 S L117 AND L11
L121         13 S L117 AND L12
L122          1 S L117 AND L13
L123          1 S L117 AND L14
L124         19 S L118 OR L119 OR L120 OR L121 OR L122 OR L123
L125         42 S (L84 OR L85 OR L87 OR L88 OR L89 OR L90 OR L93 OR L94 O
L126         45 S (L18 OR L24 OR L28 OR L31 OR L32 OR L33 OR L34 OR L38 O
L127          5 S L125 AND L114 AND L115
L128         41 S L125 AND L114
L129         10 S L126 AND L114 AND L115
L130         44 S L126 AND L114
L131         34 S L124 OR L127 OR L129
L132         37 S L125 NOT L131
L133         35 S L126 NOT (L131 OR L132)
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FILE 'REGISTRY' ENTERED AT 16:19:53 ON 24 JAN 2003

=> file hca
FILE 'HCA' ENTERED AT 16:20:04 ON 24 JAN 2003

=> d l131 1-34 cbib abs hitstr hitind

L131 ANSWER 1 OF 34 HCA COPYRIGHT 2003 ACS
137:297854 Soft **stainless steel** sheet suitable for deep-drawing formability or cold forging. Ishikawa, Hanji; Otsuka, Masato; Suzuki, Satoshi; Tanaka, Hideki; Katsuki, Junichi; Yamauchi, Takashi; Hiramatsu, Naoto (Nisshin Steel Co., Ltd., Japan). Eur. Pat. Appl. EP 1249513 A1 20021016, 23 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR. (English). CODEN: EPXXDW. APPLICATION: EP 2002-8138 20020411. PRIORITY: JP 2001-113724 20010412; JP 2002-6355 20020115.

AB The austenitic **stainless steel** sheet with decreased hardness for deep-drawing formability typically contains C and N at .ltoreq.0.06 total, Si .ltoreq.2.0, Mn .ltoreq.5, Cr 15-20, Ni 5-9, Cu 1.0-4.0, Al .ltoreq.0.003, and S .ltoreq.0.005%, optionally with Ti .ltoreq.0.5, Nb .ltoreq.0.5, Zr .ltoreq.0.5, V .ltoreq.0.5, Mo .ltoreq.3.0, B .ltoreq.0.03, rare-earth metals .ltoreq.0.02, and/or Ca .ltoreq.0.03%. The inclusions in **stainless steel** are at .gtoreq.70% of the MnO-SiO2-Al2O3 type contg. .gtoreq.15% SiO2 and .ltoreq.40% Al2O3. The **stainless steel** sheets show strain-hardening exponent of 0.40-0.55 in tensile test with true stain-true stress curve, and elongation .gtoreq.50%. The typical **stainless steel** for sheets 0.4 mm thick having **tensile strength** of 511 MPa, yield strength 220 MPa, elongation 55%, and Vickers microhardness of 111 contains C 0.014, N 0.021, Si 0.37, Mn 1.69, Cr 16.90, Ni 7.91, Cu 3.20, Mo 0.10, and S 0.001%.

IT **468054-20-8**
(austenitic, alloying of; **stainless steel** sheet with decreased hardness for deep-drawing formability)

RN 468054-20-8 HCA

CN Iron alloy, base, Fe 55-79,Cr 15-20,Ni 5-9,Mn 0-5,Cu 1-4,Mo 0-3,Si 0-2,Nb 0-0.5,Ti 0-0.5,V 0-0.5,Zr 0-0.5,C 0-0.1,N 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	55 - 79	7439-89-6
Cr	15 - 20	7440-47-3
Ni	5 - 9	7440-02-0
Mn	0 - 5	7439-96-5

Cu	1	-	4	7440-50-8
Mo	0	-	3	7439-98-7
Si	0	-	2	7440-21-3
Nb	0	-	0.5	7440-03-1
Ti	0	-	0.5	7440-32-6
V	0	-	0.5	7440-62-2
Zr	0	-	0.5	7440-67-7
C	0	-	0.1	7440-44-0
N	0	-	0.1	17778-88-0

IC ICM C22C038-42
ICS C21D008-04
CC 55-3 (Ferrous Metals and Alloys)
ST **stainless steel** alloying austenitic sheet formability
IT Metalworking
(deep drawing; **stainless steel** sheet with inclusions and low stacking-fault energy for deep drawing)
IT Stacking fault energy
(**stainless steel** sheet with inclusions and low stacking-fault energy for deep drawing)
IT 468054-19-5 **468054-20-8**
(austenitic, alloying of; **stainless steel** sheet with decreased hardness for deep-drawing formability)
IT 259735-45-0 437604-81-4 437604-84-7 437604-86-9 468054-21-9 468054-22-0 468054-23-1 468054-24-2 468054-25-3 468054-26-4 468054-27-5 468054-28-6 468054-29-7 468054-30-0 468054-31-1 468054-32-2 468054-33-3
(austenitic; **stainless steel** with controlled inclusions and decreased hardness for deep drawing)
IT 1344-28-1, Alumina, uses 1344-43-0, Manganese oxide (MnO), uses 7631-86-9, Silica, uses
(inclusions contg.; **stainless steel** sheet with inclusions and decreased hardness for deep drawing)

L131 ANSWER 2 OF 34 HCA COPYRIGHT 2003 ACS
137:172839 Martensitic **stainless steel** having high strength and corrosion resistance, and suitable for shafts or impellers. Jung, Jae-Young (Research Institute of Industrial Science & Technology, S. Korea). Brit. UK Pat. Appl. GB 2368849 A1 20020515, 21 pp. (English). CODEN: BAXXDU. APPLICATION: GB 2000-27771 20001114.
AB The martensitic **stainless steel** contains C <0.06, Si <2.5, Mn <2.5, Cr 10.0-19.0, Ni 1.0-6.0, W 0.5-6.0, Mo <3.5, Nb <0.5, V <0.5, Cu <3.0, and N 0.05-0.25%, optionally with Ti <0.8 and/or Ta <1.0%. The cast or forged **stainless steel** is typically finished by austenitizing at 800-1150.degree. and/or tempering at 350-575.degree.. The typical **stainl ss steel** having **tensile** yield **strength** of 106 MPa and elongation of 11.0% contains C 0.03, Si 0.25, Mn 0.4, Cr 16.0, Ni 2.0, W 3.0, Mo 0.5, Nb 0.1, V 0.2, Cu 0.5, and N 0.08%. Corrosion rate of the similar **stainless**

steel is decreased by austenitization heat treatment after casting.

IT **448895-46-3 448895-47-4**
(alloying of; martensitic **stainless steel** having high strength for shafts or impellers)

RN 448895-46-3 HCA

CN Iron alloy, base, Fe 56-88,Cr 10-19,Ni 1-6,W 0.5-6,Mo 0-3.5,Cu 0-3,Mn 0-2.5,Si 0-2.5,Nb 0-0.5,V 0-0.5,N 0-0.2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	56	-	88	7439-89-6
Cr	10	-	19	7440-47-3
Ni	1	-	6	7440-02-0
W	0.5	-	6	7440-33-7
Mo	0	-	3.5	7439-98-7
Cu	0	-	3	7440-50-8
Mn	0	-	2.5	7439-96-5
Si	0	-	2.5	7440-21-3
Nb	0	-	0.5	7440-03-1
V	0	-	0.5	7440-62-2
N	0	-	0.2	17778-88-0
C	0	-	0.1	7440-44-0

RN 448895-47-4 HCA

CN Iron alloy, base, Fe 54-88,Cr 10-19,Ni 1-6,W 0.5-6,Mo 0-3.5,Cu 0-3,Mn 0-2.5,Si 0-2.5,Ta 0-1,Ti 0-0.8,Nb 0-0.5,V 0-0.5,N 0-0.2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	54	-	88	7439-89-6
Cr	10	-	19	7440-47-3
Ni	1	-	6	7440-02-0
W	0.5	-	6	7440-33-7
Mo	0	-	3.5	7439-98-7
Cu	0	-	3	7440-50-8
Mn	0	-	2.5	7439-96-5
Si	0	-	2.5	7440-21-3
Ta	0	-	1	7440-25-7
Ti	0	-	0.8	7440-32-6
Nb	0	-	0.5	7440-03-1
V	0	-	0.5	7440-62-2
N	0	-	0.2	17778-88-0
C	0	-	0.1	7440-44-0

IC ICM C22C038-44
ICS B23K035-30; C22C038-46; C22C038-48; C22C038-50; C22C038-58

CC 55-3 (Ferrous Metals and Alloys)

ST martensitic **stainless steel** alloying strength shaft; cast martensitic **stainless steel** corrosion resistance

IT Impellers
Shafts
(**stainless steel** for; martensitic **stainless steel** having high strength for shafts or impellers)

IT Cast alloys
(**stainless steel**; martensitic **stainless steel** having high strength for shafts or impellers)

IT **448895-46-3 448895-47-4** 448895-48-5
(alloying of; martensitic **stainless steel** having high strength for shafts or impellers)

IT 429697-28-9 429697-29-0 429697-30-3 429697-31-4 429697-32-5 429697-33-6 429697-34-7 429697-35-8
(high-strength; martensitic **stainless steel** having high strength for shafts or impellers)

L131 ANSWER 3 OF 34 HCA COPYRIGHT 2003 ACS
135:110148 High-strength martensitic **stainless steel** for cold-rolled strip manufactured without edge cracks. Hiramatsu, Naoto; Tomimura, Kouki; Isozaki, Seiichi (Nisshin Steel Co., Ltd., Japan). Eur. Pat. Appl. EP 1118687 A1 20010725, 23 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-100827 20010115. PRIORITY: JP 2000-12579 20000121; JP 2000-233534 20000801.

AB The martensitic **stainless steel** for high-strength sheet suitable for gasket manuf. contains C 0.03-0.15, Si 0.2-2.0, Mn .ltoreq.1.0, Cr 14.0-17.0, Ni 2.0-5.0, N 0.03-0.10, B 0.0010-0.0070, P .ltoreq.0.06, and S .ltoreq.0.006%, optionally with Mo and/or Cu at .gtoreq.2.0% total. The as-cast **steel** ingot slab preferably contains <10% .**delta**.-**ferrite** by vol. to prevent edge cracks in strip rolling. The **stainless steel** strip is finished by intermediate annealing for .ltoreq.10 h at 600-800.degree. for the Vickers microhardness .apprx.360, followed by cold rolling stage for .ltoreq.85% redn., and then the finish annealing for .ltoreq.300 s at 950-1050.degree. and skin-pass rolling at 1-10% redn. The typical **stainless steel** for crack-free gaskets sheet manuf. contains C 0.084, Si 0.64, Mn 0.73, Cr 16.04, Ni 3.51, N 0.081, B 0.0030, P 0.030, and S 0.0034%. The resulting skin-pass rolled sheet shows the spring elastic limit in bending of .apprx.1500 N/mm2 as well as comparable **tensile strength**, vs. only 480 N/mm2 for the SUS 301 **stainless steel** finish rolled at 50% redn.

IT **349642-73-5**
(martensitic; **stainless steel** for martensitic strip cold rolled without edge cracks for gaskets)

RN 349642-73-5 HCA

CN Iron alloy, base, Fe 79,Cr 15,Ni 2.8,Mo 1.2,Cu 1.1,Si 0.5,Mn 0.2,C 0.1,N 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	79	7439-89-6
Cr	15	7440-47-3
Ni	2.8	7440-02-0
Mo	1.2	7439-98-7
Cu	1.1	7440-50-8
Si	0.5	7440-21-3
Mn	0.2	7439-96-5
C	0.1	7440-44-0
N	0.1	17778-88-0

IC ICM C22C038-54
ICS C21D006-00
CC 55-3 (Ferrous Metals and Alloys)
ST **stainless steel** martensitic strip spring; engine gasket sheet martensitic **stainless steel**
IT Metalworking
(martensitic strip by; **stainless steel** for martensitic strip cold rolled without edge cracks for gaskets)
IT Gaskets
Springs (mechanical)
(martensitic strip for; **stainless steel** for martensitic strip cold rolled without edge cracks for gaskets)
IT 349642-55-3
(martensitic, alloying of; **stainless steel** for martensitic strip cold rolled without edge cracks for gaskets)
IT 12597-68-1, **Stainless steel**, uses 349642-56-4 349642-57-5 349642-58-6 349642-59-7 349642-60-0 349642-61-1 349642-62-2 349642-63-3 349642-64-4 349642-65-5 349642-66-6 349642-67-7 349642-68-8 349642-69-9 349642-70-2 349642-71-3 349642-72-4 **349642-73-5**
(martensitic; **stainless steel** for martensitic strip cold rolled without edge cracks for gaskets)

L131 ANSWER 4 OF 34 HCA COPYRIGHT 2003 ACS
134:355949 Ultrahigh-strength metastable austenitic **stainless steels** containing titanium and their preparation.
Hiramatsu, Naoto; Tomimura, Hironori (Nisshin Steel Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001131713 A2 20010515, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-315248 19991105.
AB The **stainless steels** contain C .ltoreq.0.15, Si >1.0 and .ltoreq.6.0, Mn .ltoreq.5.0, Ni 4.0-10.0, Cr 12.0-18.0, Cu .ltoreq.3.5, Mo .ltoreq.5.0, N .ltoreq.0.02, and Ti 0.1-0.5 wt.% [Si + Mo .gtoreq.3.5, Md (N) = 20-140, Md(N) = 580 - 520C - 2Si - 16Mn - 16Cr - 23Ni - 300N - 26Cu - 10Mo], and have structure composed of 50-95 vol.% of martensite and balance austenite. Mo-contg. ppts.

and Ti-contg. ppts. are dispersed in the martensite phase. The **stainless steels** may further contain .ltoreq.0.5 wt.% of V and/or .ltoreq.0.5 wt.% of Nb. The **stainless steels** are prepd. by soln. treatment, cold forming to give the structure, and aging at 300-600.degree. for 0.5-300 min to achieve .gtoreq.2200 N/mm2 **tensile strength**.

IT **339169-25-4**
(prepn. of ultrahigh-strength metastable austenitic martensitic **stainless steels** contg. Ti)

RN 339169-25-4 HCA

CN Iron alloy, base, Fe 51-83,Cr 12-18,Ni 4-10,Si 1-6,Mn 0-5,Mo 0-5,Cu 0-3.5,Ti 0.1-0.5,Nb 0-0.5,V 0-0.5,C 0-0.2 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	51	-	83	7439-89-6
Cr	12	-	18	7440-47-3
Ni	4	-	10	7440-02-0
Si	1	-	6	7440-21-3
Mn	0	-	5	7439-96-5
Mo	0	-	5	7439-98-7
Cu	0	-	3.5	7440-50-8
Ti	0.1	-	0.5	7440-32-6
Nb	0	-	0.5	7440-03-1
V	0	-	0.5	7440-62-2
C	0	-	0.2	7440-44-0

IC ICM C22C038-00
ICS C21D009-46; C22C038-58

CC 55-11 (Ferrous Metals and Alloys)

ST austenitic titanium **stainless steel** metastable strength; martensite austenite **stainless steel** strength prepn; aging martensite austenite **stainless steel**

IT Aging, materials
(prepn. of ultrahigh-strength metastable austenitic martensitic **stainless steels** contg. Ti)

IT 12173-93-2P, Martensite, preparation
(prepn. of ultrahigh-strength metastable austenitic martensitic **stainless steels** contg. Ti)

IT 339169-16-3 339169-17-4 339169-18-5 339169-19-6 339169-20-9 339169-21-0 339169-22-1 339169-23-2
(prepn. of ultrahigh-strength metastable austenitic martensitic **stainless steels** contg. Ti)

IT 339169-24-3 **339169-25-4**
(prepn. of ultrahigh-strength metastable austenitic martensitic **stainless steels** contg. Ti)

IT 12244-31-4, Austenite, uses
(prepn. of ultrahigh-strength metastable austenitic martensitic **stainless steels** contg. Ti)

L131 ANSWER 5 OF 34 HCA COPYRIGHT 2003 ACS
132:337489 An austenitic **stainless steel** with Ni content lower than 2%. Mecozzi, M. G.; Barteri, M.; Di Schino, A.; Sanchez, R. (Centro Sviluppo Materiali, Italy). Metallurgia Italiana, 91(10), 49-55 (Italian) 1999. CODEN: MITLAC. ISSN: 0026-0843. Publisher: Edimet.

AB Samples of a new austenitic **stainless steel** with a Ni content less than 2% were produced with variation of the alloying elements. The .**delta**.-**ferrite** content in this cast **steel** was varied and related to the content on these varying elements. A content of more than 7% Mn did not exhibit a power for austenitic formation, and the austenitic power of Cu was strongly reduced at concns. >2.5%. The austenite forming power of C was higher than that of N, and Mo showed a higher power for ferrite formation than Cr. Samples of 7 different chem. compns. were annealed for 4 h at 1200.degree. to det. the effect of heat on the microstructure of the **steel**, and it was found that the heat treatment did not det. the soln. of the ferritic phase, and the magnetic phase content did not increase for temps. below room temp. The microstructure and the corrosion behavior of the **steel** samples were investigated. It was found that good mech. properties and resistivity against martensitic transformation were accompanied with an improvement of the corrosion resistance in **steel** samples with a Cr content of 18%. An abridged English version is included.

IT **268550-27-2**
(austenitic **stainless steel** with Ni content lower than 2%)

RN 268550-27-2 HCA

CN Iron alloy, base, Fe 62-81,Cr 14-18,Mn 5-13,Cu 0-3,Ni 0-2,Mo 0-1,Si 0-1,N 0.1-0.2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	62	-	81	7439-89-6
Cr	14	-	18	7440-47-3
Mn	5	-	13	7439-96-5
Cu	0	-	3	7440-50-8
Ni	0	-	2	7440-02-0
Mo	0	-	1	7439-98-7
Si	0	-	1	7440-21-3
N	0.1	-	0.2	17778-88-0
C	0	-	0.1	7440-44-0

CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 77

ST austenitic **stainless steel** low nickel content

IT Corrosion
Deformation (mechanical)
Fracture (materials)
Magnetic transition

Microstructure
Strain hardening
Tensile strength
(of austenitic **stainless steel** with Ni content lower than 2%)

IT 12597-68-1, Austenitic **stainless steel**, processes **268550-27-2**
(austenitic **stainless steel** with Ni content lower than 2%)

IT 12427-24-6, Ferrite (ferrous metal component)
(of austenitic **stainless steel** with Ni content lower than 2%)

L131 ANSWER 6 OF 34 HCA COPYRIGHT 2003 ACS

132:81690 A process model for the heat-affected zone microstructure evolution in duplex **stainless steel** weldments: part I. The model. Hemmer, H.; Grong, O. (Institute of Energy Technology, Kjeller, N-2027, Norway). Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science, 30A(11), 2915-2929 (English) 1999. CODEN: MMTAEB. ISSN: 1073-5623. Publisher: Minerals, Metals & Materials Society.

AB The present investigation is concerned with modeling of the microstructure evolution in duplex **stainless steels** under thermal conditions applicable to welding. The important reactions that were modeled are the dissoln. of austenite during heating, subsequent grain growth in the **delta ferrite** regime, and finally, the decompn. of the **delta ferrite** to austenite during cooling. As a starting point, a differential formulation of the underlying diffusion problem is presented, based on the internal-state variable approach. These solns. are later manipulated and expressed in terms of the Scheil integral in the cases where the evolution equation is separable or can be made separable by a simple change of variables. The models have then been applied to describe the heat-affected zone microstructure evolution during both thick-plate and thin-plate welding of three com. duplex **stainless steel** grades: 2205, 2304, and 2507. The results may conveniently be presented in the form of novel process diagrams, which display contours of const. **delta ferrite grain size** along with information about dissoln. and repptn. of austenite for different combinations of weld input energy and peak temp. These diagrams are well suited for quant. readings and illustrate, in a condensed manner, the competition between the different variables that lead to structural changes during welding of duplex **stainless steels**.

IT **96782-21-7**, AISI 2304
(microstructure of heat-affected zone in duplex **stainless steel** weldments)

RN 96782-21-7 HCA

CN Iron alloy, base, Fe 65-75,Cr 21.5-24.5,Ni 3.0-5.5,Mn 0-2.50,Si 0-1.0,Cu 0.05-0.60,Mo 0.05-0.60,N 0.05-0.20,P 0-0.040,S 0-0.040,C 0-0.030 (UNS S39230) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	65	-	75	7439-89-6
Cr	21.5	-	24.5	7440-47-3
Ni	3.0	-	5.5	7440-02-0
Mn	0	-	2.50	7439-96-5
Si	0	-	1.0	7440-21-3
Cu	0.05	-	0.60	7440-50-8
Mo	0.05	-	0.60	7439-98-7
N	0.05	-	0.20	17778-88-0
P	0	-	0.040	7723-14-0
S	0	-	0.040	7704-34-9
C	0	-	0.030	7440-44-0

CC 56-8 (Nonferrous Metals and Alloys)
ST model heating microstructure **stainless steel** weld
IT Diffusion
Grain growth
Grain size
Microstructure
(microstructure of heat-affected zone in duplex **stainless steel** weldments)
IT Welds
(**stainless steel**; microstructure of heat-affected zone in duplex **stainless steel** weldments)
IT 12597-68-1, **Stainless steel**, processes
(microstructure of heat-affected zone in duplex **stainless steel** weldments)
IT 12244-31-4, Austenite, properties 12427-24-6, Ferrite (ferrous metal component)
(microstructure of heat-affected zone in duplex **stainless steel** weldments)
IT 71631-40-8 **96782-21-7**, AISI 2304 139658-37-0, SAF 2507
(microstructure of heat-affected zone in duplex **stainless steel** weldments)

L131 ANSWER 7 OF 34 HCA COPYRIGHT 2003 ACS
131:274789 Weld microstructure development and properties of precipitation-strengthened martensitic **stainless steels**. Brooks, J. A.; Garrison, W. M., Jr. (Sandia National Laboratories, Livermore, CA, USA). Welding Research (Miami) (Aug.), 280s-291s Published in: Weld. J. (Miami), 78(8) (English) 1999. CODEN: WERSA3. ISSN: 0096-7629. Publisher: American Welding Society.
AB The weld microstructural evolution, mech. properties and solidification cracking susceptibility of 3 pptn.-strengthened martensitic **stainless steels** - PH 13-8 Mo, Custom 450 and 15-5 PH - were studied. Liq. Sn quenching of gas W

arc welds revealed that all 3 welds solidified as single-phase ferrite with a high degree of microsegregation. However, during further solidification and cooling almost complete homogenization occurred as a result of solid-state diffusion. The welds in all 3 alloys exhibited good resistance to solidification cracking and generally exhibited tensile and impact properties similar to those of the base metal. However, in almost all cases, the weld **Charpy** impact energies were somewhat less than those of the base metals. The cracking behavior and mech. properties are discussed in terms of microstructural evolution.

IT **37222-71-2**, Custom 450
(weld microstructure development and properties of pptn.-strengthened martensitic **stainless steels**
)

RN 37222-71-2 HCA

CN Iron alloy, base, Fe 72-79,Cr 14.00-16.00,Ni 5.00-7.00,Cu 1.25-1.75,Mo 0.50-1.00,Mn 0-1.00,Si 0-1.00,Nb 0.4,C 0-0.05,P 0-0.030,S 0-0.030 (UNS S45000) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	72 - 79	7439-89-6
Cr	14.00 - 16.00	7440-47-3
Ni	5.00 - 7.00	7440-02-0
Cu	1.25 - 1.75	7440-50-8
Mo	0.50 - 1.00	7439-98-7
Mn	0 - 1.00	7439-96-5
Si	0 - 1.00	7440-21-3
Nb	0.4	7440-03-1
C	0 - 0.05	7440-44-0
P	0 - 0.030	7723-14-0
S	0 - 0.030	7704-34-9

CC 55-9 (Ferrous Metals and Alloys)

ST weld microstructure development pptn strengthened martensitic **stainless steel**

IT **37222-71-2**, Custom 450 39344-65-5 39403-20-8
(weld microstructure development and properties of pptn.-strengthened martensitic **stainless steels**
)

IT 12597-69-2, **Steel**, properties
(welded; weld microstructure development and properties of pptn.-strengthened martensitic **stainless steels**
)

L131 ANSWER 8 OF 34 HCA COPYRIGHT 2003 ACS

131:246123 Effect of boron on the weldability and properties of austenitic-ferritic **steels**. Yushchenko, K. A.; Avdeeva, A. K.; Kakhovskii, Yu. N. (Inst. Elektrosvarki im. I.O. Patona, NAN Ukr., Ukraine). Avtomaticheskaya Svarka (4), 54-56 (Russian) 1999. CODEN: AVSVAU. ISSN: 0005-111X. Publisher: Institut Elektrosvarki

im. E. O. Patona NAN Ukrainy.

AB Effect of B on the stabilization of austenite phase in welding and reheating was evaluated in the 2-phase 08Kh22N6T **stainless steel**. The amt. of B required for prevention of the austenite transformation to **.delta.-ferrite** in reheating depends on the initial amt. of austenite, ppt. **grain size**, and the content of nitride-forming metals (esp. Ti) in **stainless steel**. The 2-phase **stainless steels** microalloyed with B are insensitive to reheating of the heat-affected weld zone; but show decreased impact toughness at the higher B content.

IT **12661-77-7**, 08Kh22N6T
(welding of; boron effect on stabilizing of austenite phase in welding of 2-phase **stainless steel**)

RN 12661-77-7 HCA

CN Iron alloy, base, Fe 68-74,Cr 21.0-23.0,Ni 5.30-6.30,Mn 0-0.80,Si 0-0.80,Ti 0-0.65,Cu 0-0.30,Mo 0-0.30,W 0-0.20,C 0-0.08,P 0-0.035,S 0-0.025 (08Kh22N6T) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	68	-	74	7439-89-6
Cr	21.0	-	23.0	7440-47-3
Ni	5.30	-	6.30	7440-02-0
Mn	0	-	0.80	7439-96-5
Si	0	-	0.80	7440-21-3
Ti	0	-	0.65	7440-32-6
Cu	0	-	0.30	7440-50-8
Mo	0	-	0.30	7439-98-7
W	0	-	0.20	7440-33-7
C	0	-	0.08	7440-44-0
P	0	-	0.035	7723-14-0
S	0	-	0.025	7704-34-9

CC 55-9 (Ferrous Metals and Alloys)

ST **stainless steel** welding boron stabilizing austenite

IT Welding of metals
(of **stainless steel**; boron effect on stabilizing of austenite phase in welding of 2-phase **stainless steel**)

IT 7440-42-8, Boron, uses
(**stainless steel** microalloyed with; boron effect on stabilizing of austenite phase in welding of 2-phase **stainless steel**)

IT **12661-77-7**, 08Kh22N6T
(welding of; boron effect on stabilizing of austenite phase in welding of 2-phase **stainless steel**)

L131 ANSWER 9 OF 34 HCA COPYRIGHT 2003 ACS

128:51341 **Stainless steel** welded structure and its

manufacture for microbe corrosion resistance. Amaya, Hisashi; Ko, Hideaki (Sumitomo Metal Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 09291343 A2 19971111 Heisei, 10 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1996-107699 19960426.

AB Claimed welded structure comprises **stainless steel** welds having .**delta.** **ferrite** ratio .ltoreq.7 vol.% and balance austenite, where content (wt.%) of Cr, Mo, N, and Ni in base metals CrO, MoO, NO, and NiO, resp. and content (wt.%) of Cr, Mo, N, and Ni in welds CrJ, MoJ, NJ, and NiJ, resp. satisfies (1) CrJ - CrO .gtoreq. 2.35, (2) MoJ - MoO .gtoreq. 0.27, and (3) (CrJ + 1.1MoJ + 12NJ + 0.1NiJ)-(CrO + 1.1MoO + 12NO + 0.1NiO) .gtoreq.2.85. Claimed process comprises welding **stainless steel** base metals contg. C .ltoreq.0.08, Si 0.1-1.5, Mn 0.1-2.5, Ni 3.5-45, Cr 15-30, Mo 0-7, Cu 0-3, N 0.002-0.3, Nb 0-0.5, Ti 0-0.5, and Al 0-0.2 wt.% by welding wire with content (wt.%) of Cr, Mo, N, Ni, Si, C, and Mn, CrW, MoW, NW, NiW, SiW, CW, and MnW, resp. satisfying (4) CrW - CrO .gtoreq. 2.5, (5) MoW - MoO .gtoreq. 0.3, (6) (CrW + 1.1MoW + 12NW + 0.1NiW) -(CrO + 1.1MoO + 12NO + 0.1NiO) .gtoreq. 3, and (7) 1.34CrW(eq) - NiW(eq) .ltoreq.14, where CrW(eq) = CrW + MoW + 1.5SiW and NiW(eq) = NiW + 30CW + 30NW + 0.5MnW. The structure is esp. suitable for app. in water environment, marine structure, etc.

IT **199933-13-6**
(base metal; **stainless steel** welded structure having controlled **.delta.** **ferrite** at welds and its manuf. for microbe corrosion resistance)

RN 199933-13-6 HCA

CN Iron alloy, base, Fe 9.4-81,Ni 3.5-45,Cr 15-30,Mo 0-7,Cu 0-3,Mn 0.1-2.5,Si 0.1-1.5,Nb 0-0.5,Ti 0-0.5,N 0-0.3,Al 0-0.2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	9.4 - 81	7439-89-6
Ni	3.5 - 45	7440-02-0
Cr	15 - 30	7440-47-3
Mo	0 - 7	7439-98-7
Cu	0 - 3	7440-50-8
Mn	0.1 - 2.5	7439-96-5
Si	0.1 - 1.5	7440-21-3
Nb	0 - 0.5	7440-03-1
Ti	0 - 0.5	7440-32-6
N	0 - 0.3	17778-88-0
Al	0 - 0.2	7429-90-5
C	0 - 0.1	7440-44-0

IC ICM C22C038-00
ICS C22C038-44

CC 55-9 (Ferrous Metals and Alloys)

ST **stainless steel** welding structure microbe corrosion

IT Welding of metals
(electrodes; **stainless steel** welded structure having controlled **.delta. ferrite** at welds and its manuf. for microbe corrosion resistance)
IT Welds
(**stainless steel** welded structure having controlled **.delta. ferrite** at welds and its manuf. for microbe corrosion resistance)
IT 11109-50-5, SUS304 11134-23-9, SUS316L **199933-13-6**
(base metal; **stainless steel** welded structure having controlled **.delta. ferrite** at welds and its manuf. for microbe corrosion resistance)
IT 199932-97-3 199932-98-4 199933-00-1 199933-03-4 199933-05-6 199933-08-9 199933-10-3 199933-11-4
(wire; **stainless steel** welded structure having controlled **.delta. ferrite** at welds and its manuf. for microbe corrosion resistance)

L131 ANSWER 10 OF 34 HCA COPYRIGHT 2003 ACS
128:6068 **Stainless steel** for cast disks in treatment of wood-pulp fibers for papermaking. Dodd, John (Beloit Technologies, Inc., USA). PCT Int. Appl. WO 9740204 A1 19971030, 21 pp. DESIGNATED STATES: W: AU, CA, JP, KR; RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1997-IB535 19970220. PRIORITY: US 1996-637114 19960424.
AB The pulp-refiner disks or segments are cast from the **stainless steel** alloyed for C 0.2-0.4 and Nb 1.5-2.5% in addn. to Mn 0.5-1.5, Si 0.5-1.5, Cr 14-18, Ni 2-5, Cu 2-5, Mo .ltoreq.1, S .ltoreq.0.05, and P .ltoreq.0.05%. The alloying with increased C and Nb (vs. the similar 17-4PH maraging **steel**) promotes formation of dispersed Nb-rich carbides during the melting and solidification, resulting in hardness and toughness as well as resistance to corrosion and wear. The cast parts are preferably heat treated by heating at 1600-1800.degree. F followed by rapid cooling in air to room **temp**., and then **tempering** at 900-1500.degree. F to increase the Nb carbide **grain size**.
IT **198884-33-2**
(cast; **stainless steel** for cast disks in slurry finishing of wood fibers for papermaking)
RN 198884-33-2 HCA
CN Iron alloy, base, Fe 65-79,Cr 14-18,Cu 2-5,Ni 2-5,Nb 1.5-2.5,Mn 0.5-1.5,Si 0.5-1.5,Mo 0-1,C 0.2-0.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	65 - 79	7439-89-6
Cr	14 - 18	7440-47-3
Cu	2 - 5	7440-50-8
Ni	2 - 5	7440-02-0

Nb	1.5 -	2.5	7440-03-1
Mn	0.5 -	1.5	7439-96-5
Si	0.5 -	1.5	7440-21-3
Mo	0 -	1	7439-98-7
C	0.2 -	0.4	7440-44-0

IC ICM C22C038-42
ICS C22C038-48; C22C038-20; C22C038-26
CC 55-2 (Ferrous Metals and Alloys)
Section cross-reference(s): 43
ST papermaking pulp cast **stainless steel** disk; niobium carbide ppt cast **stainless steel**
IT Cast alloys
(disks; **stainless steel** for cast disks in slurry finishing of wood fibers for papermaking)
IT Paper
(manuf., pulp finishing in; **stainless steel** for cast disks in slurry finishing of wood fibers for papermaking)
IT **198884-33-2** 198884-34-3
(cast; **stainless steel** for cast disks in slurry finishing of wood fibers for papermaking)
IT 12069-94-2, Niobium carbide (NbC)
(dispersed, castings with; **stainless steel** for cast disks in slurry finishing of wood fibers for papermaking)

L131 ANSWER 11 OF 34 HCA COPYRIGHT 2003 ACS
123:17970 Manufacture of surgical needles from **stainless steel** by heat treatment in vacuum. Rizk, Said; Powers, William O.; Samsel, Scott W. (United States Surgical Corp., USA). Eur. Pat. Appl. EP 646653 A1 19950405, 17 pp. DESIGNATED STATES: R: DE, ES, FR, GB, IT, SE. (English). CODEN: EPXXDW. APPLICATION: EP 1994-115129 19940926. PRIORITY: US 1993-132008 19931005.
AB Surgical needles are produced from martensitic pptn.-hardening **stainless steel** and then vacuum heat treated and vacuum cooled to increase its **tensile strength** while retaining the polished surface of the needle. The **tensile strength** of Carpenter 455 wire (diam. 0.028 in.) was 190,000 psi before pptn. heat treatment and 290,000 psi after heat pptn. under vacuum (1x10-5 torr.), at 475 degree. for 4 h and cooling under vacuum for 4.5 h to 30.degree. before injection of N to further cool to ambient temp.
IT **37222-71-2 37222-72-3 163183-61-7**
(manuf. of surgical needles from **stainless steel** by heat treatment in vacuum)
RN 37222-71-2 HCA
CN Iron alloy, base, Fe 72-79,Cr 14.00-16.00,Ni 5.00-7.00,Cu 1.25-1.75,Mo 0.50-1.00,Mn 0-1.00,Si 0-1.00,Nb 0.4,C 0-0.05,P 0-0.030,S 0-0.030 (UNS S45000) (9CI) (CA INDEX NAME)

Component Component Component

	Percent	Registry Number
Fe	72 - 79	7439-89-6
Cr	14.00 - 16.00	7440-47-3
Ni	5.00 - 7.00	7440-02-0
Cu	1.25 - 1.75	7440-50-8
Mo	0.50 - 1.00	7439-98-7
Mn	0 - 1.00	7439-96-5
Si	0 - 1.00	7440-21-3
Nb	0.4	7440-03-1
C	0 - 0.05	7440-44-0
P	0 - 0.030	7723-14-0
S	0 - 0.030	7704-34-9

8

0.6 | 0.40

RN 37222-72-3 HCA
CN Iron alloy, base, Fe 72-79,Cr 11.00-12.50,Ni 7.50-9.50,Cu 1.50-2.50,Ti 0.80-1.40,Nb 0.10-0.50,Mn 0-0.50,Mo 0-0.50,Si 0-0.50,C 0-0.05,P 0-0.040,S 0-0.030 (UNS S45500) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	72 - 79	7439-89-6
Cr	11.00 - 12.50	7440-47-3
Ni	7.50 - 9.50	7440-02-0
Cu	1.50 - 2.50	7440-50-8
Ti	0.80 - 1.40	7440-32-6
Nb	0.10 - 0.50	7440-03-1
Mn	0 - 0.50	7439-96-5
Mo	0 - 0.50	7439-98-7
Si	0 - 0.50	7440-21-3
C	0 - 0.05	7440-44-0
P	0 - 0.040	7723-14-0
S	0 - 0.030	7704-34-9

10

0.05 | 0.50

RN 163183-61-7 HCA
CN Iron alloy, base, Fe 51-85,Cr 10-17,Ni 4-11,Co 0-6,Mo 0-6,Cu 0-4,Ti 0-1.6,Al 0-1.1,Si 0.5-1,Mn 0.5-0.6,Ta 0-0.6,Nb 0-0.5,P 0-0.2,C 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	51 - 85	7439-89-6
Cr	10 - 17	7440-47-3
Ni	4 - 11	7440-02-0
Co	0 - 6	7440-48-4
Mo	0 - 6	7439-98-7
Cu	0 - 4	7440-50-8
Ti	0 - 1.6	7440-32-6
Al	0 - 1.1	7429-90-5
Si	0.5 - 1	7440-21-3

Mn	0.5	-	0.6	7439-96-5
Ta	0	-	0.6	7440-25-7
Nb	0	-	0.5	7440-03-1
P	0	-	0.2	7723-14-0
C		0.1		7440-44-0

IC ICM C21D009-26
ICS C21D006-02; C22C038-50; A61B017-06
CC 63-7 (Pharmaceuticals)
ST surgical needle **stainless steel** heat vacuum
IT Helium-group gases, uses
(manuf. of surgical needles from **stainless steel** by heat treatment in vacuum)
IT Needles
(suture, manuf. of surgical needles from **stainless steel** by heat treatment in vacuum)
IT 12173-93-2, Martensite, biological studies 12597-68-1, **Stainless steel**, biological studies 12611-80-2, 17-4 Ph 12731-97-4 **37222-71-2 37222-72-3** 39344-65-5 39403-20-8 156286-20-3 **163183-61-7**
(manuf. of surgical needles from **stainless steel** by heat treatment in vacuum)
IT 7727-37-9, Nitrogen, uses
(manuf. of surgical needles from **stainless steel** by heat treatment in vacuum)

L131 ANSWER 12 OF 34 HCA COPYRIGHT 2003 ACS
123:14756 High-strength martensitic **stainless steels** resistant to stress-corrosion cracks. Hashizume, Shuji; Minami, Yusuke; Ishizawa, Yoshiichi (NKK Corp., Japan). Eur. Pat. Appl. EP 649915 A1 19950426, 22 pp. DESIGNATED STATES: R: DE, FR, IT. (English). CODEN: EPXXDW. APPLICATION: EP 1994-116644 19941021. PRIORITY: JP 1993-264909 19931022.
AB The martensitic **stainless steels** contain C .ltoreq.0.06, Cr 12-16, Si .ltoreq.1, Mn .ltoreq.2, Ni 0.5-8, Mo 0.1-2.5, Cu 0.3-4, and N .ltoreq.0.05 wt.%, optionally with V 0.01-0.1 and/or Nb 0.01-0.1 wt.%. The microstructure has low .**delta**.-**ferrite** phase at .ltoreq.10% by area, and fine Cu ppts. dispersed in a matrix. The **stainless steel** is suitable for manuf. of strip or seamless pipe using intermediate ingot casting. The **stainless steel** is heat treated by austenitizing in the Ac3-980.degree. range, cooling for martensitic microstructure, and tempering at 500-630.degree. (or 500.degree.-Ac1 if lower) for controlled time to ppt. Cu for dispersion in the matrix. The tempered strip or pipe shows yield strength of 75 kg/mm2 and **Charpy** impact toughness .gtoreq.10 kg-m, and is resistant to stress-corrosion cracks in the presence of aq. NaCl, CO2, and/or H2S (esp. in petroleum industry applications). The typical **stainless steel** free of .**delta**.-**ferrite** contains C 0.024, Cr 14.8, Si 0.15, Mn 0.05, Ni 4.83, Mo 2.06, Cu 1.82, and N 0.002, P 0.008, S 0.002, and Al 0.024 wt.%.

IT **164107-55-5**
(heat treated; martensitic **stainless steel** resistant to stress-corrosion cracks)
RN 164107-55-5 HCA
CN Iron alloy, base, Fe 66-87,Cr 12-16,Ni 0.5-8,Cu 0.3-4,Mo 0.1-2.5,Mn 0-2,Si 0-1,C 0-0.1,Nb 0-0.1,V 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	66 - 87	7439-89-6
Cr	12 - 16	7440-47-3
Ni	0.5 - 8	7440-02-0
Cu	0.3 - 4	7440-50-8
Mo	0.1 - 2.5	7439-98-7
Mn	0 - 2	7439-96-5
Si	0 - 1	7440-21-3
C	0 - 0.1	7440-44-0
Nb	0 - 0.1	7440-03-1
V	0 - 0.1	7440-62-2

IC ICM C22C038-42
ICS C22C038-44
CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 51
ST martensitic **stainless steel** strength pipe;
stress corrosion resistant **stainless steel**;
copper ppt martensitic **stainless steel**;
petroleum martensitic **stainless steel** pipe
IT Petroleum wells
(martensitic **stainless steel** heat treated for resistance to stress-corrosion cracks)
IT Pipes and Tubes
(seamless, martensitic **stainless steel** tempered for resistance to stress-corrosion cracks)
IT 124-38-9, Carbon dioxide, uses 7783-06-4, Hydrogen sulfide, uses
(aq. media contg.; martensitic **stainless steel** heat treated for resistance to stress-corrosion cracks)
IT 7440-50-8, Copper, uses
(dispersed; martensitic **stainless steel** heat treated to ppt. copper for resistance to stress-corrosion cracks)
IT 163886-34-8 163886-35-9 163886-36-0 163886-37-1 163886-38-2
163886-39-3 163886-40-6 163886-41-7 163886-42-8 163886-43-9
163886-44-0 163886-45-1 163886-46-2 163886-47-3 163886-48-4
163886-49-5 164107-54-4 **164107-55-5**
(heat treated; martensitic **stainless steel** resistant to stress-corrosion cracks)

L131 ANSWER 13 OF 34 HCA COPYRIGHT 2003 ACS
122:319401 Austenitic **stainless steel** for hot-rolled strip finished for press formability, hot workability, and oxidation resistance. Ryoo, Do Yeal; Lee, Yong Heon; Park, Jae Seog; Kim,

Hyun Chul; Kim, Eung Ju (Pohang Iron and Steel Co., Ltd., S. Korea; Research Institute of Industrial Science and Technology). PCT Int. Appl. WO 9506142 A1 19950302, 32 pp. DESIGNATED STATES: W: CN, JP, US. (English). CODEN: PIXXD2. APPLICATION: WO 1994-KR114 19940824. PRIORITY: KR 1993-16607 19930825.

AB The austenitic **stainless steel** contains added Cu to decrease the Ni content as the austenite stabilizer, as well as minor Ti as a ferrite promoter (esp. for .apprx.9 vol.% . **delta**.-**ferrite**), and B for improved hot workability. The **stainless steel** contains C <0.07, Si <1.0, Mn <2.0, Cr 16-18, Ni 6.0-8.0, Cu <3.0, Al <0.005, P <0.05, S <0.005, Ti <0.03, B <0.003, Mo <0.3, Nb <0.1, and N <0.045 wt.%. Ingot slabs are heated at 1250-1270.degree., hot rolled with annealing at 1100-1180.degree., cooled, and pickled in acidic bath, and the intermediate strip is cold rolled, annealed for **grain size** control, cooled, pickled, and finished by skin-pass rolling. The resulting sheet shows decreased surface defects, good press formability, crack resistance, hot workability, and high-temp. oxidn. resistance. The typical **stainless steel** suitable for the sheet 0.7 mm thick contains C 0.041, Si 0.66, Mn 1.32, Cr 17.25, Ni 7.42, Cu 1.91, Al 0.001, P 0.02, S 0.002, Ti 0.017, B 0.0028, Mo 0.13, and N 0.0166 wt.%.

IT **163382-46-5**
(austenitic; **stainless steel** for strip having press formability and high-temp. oxidn. resistance)

RN 163382-46-5 HCA

CN Iron alloy, base, Fe 68-78,Cr 16-18,Ni 6-8,Cu 0-3,Mn 0-2,Si 0-1,Mo 0-0.3,C 0-0.1,Nb 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	68	-	78	7439-89-6
Cr	16	-	18	7440-47-3
Ni	6	-	8	7440-02-0
Cu	0	-	3	7440-50-8
Mn	0	-	2	7439-96-5
Si	0	-	1	7440-21-3
Mo	0	-	0.3	7439-98-7
C	0	-	0.1	7440-44-0
Nb	0	-	0.1	7440-03-1

IC ICM C22C038-54
ICS C22C038-40

CC 55-3 (Ferrous Metals and Alloys)

ST austenitic **stainless steel** press formability; copper austenitic **stainless steel** sheet

IT **163382-46-5** 163588-25-8 163588-26-9 163588-27-0 163588-28-1 163588-29-2 163588-30-5 163588-31-6
(austenitic; **stainless steel** for strip having press formability and high-temp. oxidn. resistance)

IT 7440-32-6, Titanium, uses

(microalloying with; **stainless steel** for strip having press formability and oxidn. resistance)

L131 ANSWER 14 OF 34 HCA COPYRIGHT 2003 ACS
122:270965 High-strength **stainless steels** with hot workability and their manufacture. Tomimura, Hiroki; Myakusu, Katsuhisa; Hirotsu, Sadao (Nisshin Steel Co Ltd, Japan). Jpn. Kokai Tokkyo Koho JP 07041912 A2 19950210 Heisei, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1993-206888 19930730.

AB The **stainless steel** contain C .ltoreq.0.10, Si 1.0-3.0, Mn .ltoreq.2.0, Ni 4.0-10.0, Cr 12.0-18.0, Cu .ltoreq.3.5, Mo 1.0-5.0, N .ltoreq.0.15, S .ltoreq.0.0045, and B .ltoreq.0.0100% and satisfying C + N .gtoreq.0.10, 3.0 .ltoreq. (Si + Mo) .ltoreq. 6.5%, and BS value .gtoreq.0% [BS value = 1000B - 2500(S - 0.015)] and also satisfying .delta.F .ltoreq.3.5% (where .delta.F is . **delta**. **ferrite** content defined by .delta.F = -36C - 0.13Mn - 1.3Ni - 30N - 0.39Cu + 1.3Cr + 1.3Mo + 0.67Si - 5). **Stainless steels** having **tensile strength** .gtoreq.1800 N/mm2 are manufd. from the above **steels** by soln. treatment, cold working at cold draft sufficient to form stress-induced martensite to form composite structure of the stress induced martensite phase and retained austenite phase, and aging.

IT **162788-25-2 162788-29-6 162788-34-3 162873-80-5**
(manuf. of high-strength **stainless steels** with hot workability)

RN 162788-25-2 HCA
CN Iron alloy, base, Fe 73,Cr 14,Ni 6.2,Si 2.7,Cu 2,Mo 1.2,Mn 0.4,C 0.1,N 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	73	7439-89-6
Cr	14	7440-47-3
Ni	6.2	7440-02-0
Si	2.7	7440-21-3
Cu	2	7440-50-8
Mo	1.2	7439-98-7
Mn	0.4	7439-96-5
C	0.1	7440-44-0
N	0.1	17778-88-0

RN 162788-29-6 HCA
CN Iron alloy, base, Fe 73,Cr 13,Ni 9.2,Mo 2.7,Si 1.2,Cu 0.2,Mn 0.2,C 0.1,N 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	73	7439-89-6

Cr	13	7440-47-3
Ni	9.2	7440-02-0
Mo	2.7	7439-98-7
Si	1.2	7440-21-3
Cu	0.2	7440-50-8
Mn	0.2	7439-96-5
C	0.1	7440-44-0
N	0.1	17778-88-0

RN 162788-34-3 HCA
CN Iron alloy, base, Fe 74,Cr 13,Ni 6.3,Si 2.6,Mo 2.5,Cu 1,Mn 0.4,C 0.1,N 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	74	7439-89-6
Cr	13	7440-47-3
Ni	6.3	7440-02-0
Si	2.6	7440-21-3
Mo	2.5	7439-98-7
Cu	1	7440-50-8
Mn	0.4	7439-96-5
C	0.1	7440-44-0
N	0.1	17778-88-0

RN 162873-80-5 HCA
CN Iron alloy, base, Fe 58-82,Cr 12-18,Ni 4-10,Mo 1-5,Cu 0-3.5,Si 1-3,Mn 0-2,N 0-0.2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	58 - 82	7439-89-6
Cr	12 - 18	7440-47-3
Ni	4 - 10	7440-02-0
Mo	1 - 5	7439-98-7
Cu	0 - 3.5	7440-50-8
Si	1 - 3	7440-21-3
Mn	0 - 2	7439-96-5
N	0 - 0.2	17778-88-0
C	0 - 0.1	7440-44-0

IC ICM C22C038-00
ICS C21D008-00; C22C038-44; C22C038-54; C22C038-58
CC 55-11 (Ferrous Metals and Alloys)
ST **stainless steel** workability high strength;
stress induced martensite **stainless steel**;
retained austenite **stainless steel**
IT Metalworking
(manuf. of high-strength **stainless steels** with hot workability)

IT **162788-25-2** 162788-26-3 162788-27-4 162788-28-5
162788-29-6 162788-30-9 162788-31-0 162788-32-1
162788-33-2 **162788-34-3** 162788-35-4 162788-36-5
162788-37-6 162788-38-7 **162873-80-5**
(manuf. of high-strength **stainless steels** with hot workability)

IT 12244-31-4P, Austenite, preparation
(retaned; manuf. of high-strength **stainless steels** with hot workability)

IT 12173-93-2P, Martensite, preparation
(stress-induced; manuf. of high-strength **stainless steels** with hot workability)

L131 ANSWER 15 OF 34 HCA COPYRIGHT 2003 ACS
120:112993 **Stainless steel** having high elastic limit and good fatigue properties, and its manufacture. Hirotsu, Sadao; Uematsu, Yoshihiro; Takemoto, Toshihiko; Hayashi, Shigeto; Tanaka, Teruo (Nisshin Steel Co Ltd, Japan). Jpn. Kokai Tokkyo Koho JP 05279802 A2 19931026 Heisei, 10 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1991-69467 19910311.

AB The **steel** contains C .ltoreq.0.08, S .ltoreq.3.0, Mn .ltoreq.4.0, Ni 4.0-10.0, Cr 13.0-20.0, N 0.06-0.30, and O .ltoreq.0.007% with 330 - 480C -2Si - 10Mn - 14Ni - 5.4Cr - 320N .gtoreq.40. The sheets of **steel** are manufd. by hot rolling, cold rolling at draft .gtoreq.50%, annealing, esp. at 700-1000.degree., for a substantially martensitic structure having **grain diam**. .ltoreq.10 .mu.m, and temper rolling at draft .gtoreq.45% for martensitic phase .gtoreq.60 vol.%. The **steel** having high strength and elastic limit is suitable, e.g., for engine gaskets.

IT **152517-34-5**
(with high elastic limit and good fatigue properties, for engine gaskets)

RN 152517-34-5 HCA
CN Iron alloy, base, Fe 73,Cr 16,Ni 5.8,Si 2,Mo 1.1,Cu 1,Mn 0.6,Nb 0.4,C 0.1,N 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	73	7439-89-6
Cr	16	7440-47-3
Ni	5.8	7440-02-0
Si	2	7440-21-3
Mo	1.1	7439-98-7
Cu	1	7440-50-8
Mn	0.6	7439-96-5
Nb	0.4	7440-03-1
C	0.1	7440-44-0
N	0.1	17778-88-0

IC ICM C22C038-00

ICS C21D008-02; C22C038-50
CC 55-3 (Ferrous Metals and Alloys)
ST **stainless steel** elastic limit fatigue; engine gasket **stainless steel**
IT Gaskets
(**stainless steel** with high elastic limit and good fatigue strength for, for engines)
IT 152517-28-7 152517-29-8 152517-30-1 152517-31-2 152517-32-3 152517-33-4 **152517-34-5** 152517-35-6 152517-36-7 152761-48-3
(with high elastic limit and good fatigue properties, for engine gaskets)

L131 ANSWER 16 OF 34 HCA COPYRIGHT 2003 ACS
112:81953 Processing of corrosion-resistant **steel** strips.
Hewitt, Jack (Middelburg Steel and Alloys (Pty.) Ltd., S. Afr.). Eur. Pat. Appl. EP 343008 A2 19891123, 15 pp. DESIGNATED STATES: R: AT, BE, DE, ES, FR, GB, IT, NL, SE. (English). CODEN: EPXXDW. APPLICATION: EP 1989-305108 19890519. PRIORITY: ZA 1988-3551 19880519.
AB Ferritic **stainless steels** of AISI 409, 410, or 420 type are hot rolled in the austenitic temp. range, coiled, and cooled at 1-10.degree./min in the 650-850.degree. range (characteristic of austenite transformation to ferrite and carbides) to prevent local hardening by formation of bainite or martensite. The **stainless steels** contain C .ltoreq.0.25, Cr 10-18, Ni 0-5, N and P .ltoreq.0.1 each, Mn .ltoreq.2.5, Si .ltoreq.2.0, Al .ltoreq.0.5, C 0-2.0, and optionally Ti, Mo, V, Zr, and/or Nb .ltoreq.1.0% each. No sep. heat treatment in annealing furnace is required. The hot-rolled strips are thermally insulated to control the cooling rate. The stripa show Brinell hardness of 165, **tensile strength** 520 mPa, yield point 350 mPa, and elongation 25%, and is suitable for manuf. of cutlery and toods.
IT **125327-22-2**
(ferritic, hot rolling and heat treatment of)
RN 125327-22-2 HCA
CN Iron alloy, base, Fe 65-90,Cr 10-18,Ni 0-5,Mn 0-2.5,Cu 0-2,Si 0-2,Mo 0-1,Nb 0-1,Ti 0-1,V 0-1,Zr 0-1,Al 0-0.5,C 0-0.2,N 0-0.1,P 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	65 - 90	7439-89-6
Cr	10 - 18	7440-47-3
Ni	0 - 5	7440-02-0
Mn	0 - 2.5	7439-96-5
Cu	0 - 2	7440-50-8
Si	0 - 2	7440-21-3
Mo	0 - 1	7439-98-7
Nb	0 - 1	7440-03-1

Ti	0	-	1	7440-32-6
V	0	-	1	7440-62-2
Zr	0	-	1	7440-67-7
Al	0	-	0.5	7429-90-5
C	0	-	0.2	7440-44-0
N	0	-	0.1	17778-88-0
P	0	-	0.1	7723-14-0

IC ICM C21D008-02
ICS C21D001-84; C21D006-00; C22C038-18; C22C038-24; C22C038-28; C22C038-40
CC 55-11 (Ferrous Metals and Alloys)
ST rolling heat treatment **stainless steel**
IT Cutlery
Tools
(**stainless steel** for, hot rolling and heat treatment of)
IT 12597-68-1, **Stainless steel**, uses and miscellaneous 12611-79-9, AISI 410 37241-55-7, AISI 420 39418-83-2, AISI 409 **125327-22-2** 125327-23-3 125327-24-4
(ferritic, hot rolling and heat treatment of)

L131 ANSWER 17 OF 34 HCA COPYRIGHT 2003 ACS
110:237089 Surgical needle sharpness. Thacker, John G.; Rodeheaver, George T.; Towler, Michael A.; Edlich, Richard F. (Sch. Med., Univ. Virginia, Charlottesville, VA, 22908, USA). American Journal of Surgery, 157(3), 334-9 (English) 1989. CODEN: AJSUAB. ISSN: 0002-9610.
AB A std. reproducible test to det. surgical needle sharpness was developed. This parameter was measured by recording the max. force required to push a curved surgical needle through a thin laminated synthetic membrane. Three comparable groups of reversed cutting-edge needles were selected from different manufacturers for needle penetration testing. The results of this testing demonstrated that the needle diam., manufg. process, and the manufacturer were all important determinants of needle sharpness. Needles with a smaller diam. were sharper than those with a larger diam. In addn., electrohoned or hand-honed needles were sharper than those subjected to only machine grinding. SEM photographs and elemental anal. of the surgical needles could be correlated with their sharpness. The sharper needles had long, narrow cutting edge geometries compared with the short wide geometries of duller needles. The sharpest needles were manufd. from an American Society for Testing and Materials (**ASTM**) 45500 **stainless steel** alloy that has **stronger tensile** and yield **strength** than those of **ASTM** 42000 and 42020 alloys used in the creation of the other needles. This stronger alloy allows the manufactureer to produce a longer, narrower cutting point geometry with reduced danger of either bending or breakage during surgery compared with needles made from weaker alloys (**ASTM** 42000 and **ASTM** 42020), which

accounts for the superior sharpness of the Ethicon surgical needles.

IT **37222-72-3**
(surgical needles, sharpness of)

RN 37222-72-3 HCA

CN Iron alloy, base, Fe 72-79,Cr 11.00-12.50,Ni 7.50-9.50,Cu 1.50-2.50,Ti 0.80-1.40,Nb 0.10-0.50,Mn 0-0.50,Mo 0-0.50,Si 0-0.50,C 0-0.05,P 0-0.040,S 0-0.030 (UNS S45500) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	72 - 79	7439-89-6
Cr	11.00 - 12.50	7440-47-3
Ni	7.50 - 9.50	7440-02-0
Cu	1.50 - 2.50	7440-50-8
Ti	0.80 - 1.40	7440-32-6
Nb	0.10 - 0.50	7440-03-1
Mn	0 - 0.50	7439-96-5
Mo	0 - 0.50	7439-98-7
Si	0 - 0.50	7440-21-3
C	0 - 0.05	7440-44-0
P	0 - 0.040	7723-14-0
S	0 - 0.030	7704-34-9

CC 63-7 (Pharmaceuticals)

ST **stainless steel** surgical needle sharpness

IT Needles
(**stainless steel**, sharpness of)

IT **37222-72-3** 37241-55-7 120961-79-7
(surgical needles, sharpness of)

L131 ANSWER 18 OF 34 HCA COPYRIGHT 2003 ACS

107:240554 Microstructures and mechanical properties of boride-dispersed precipitation-hardening **stainless steels** produced by RST [rapid solidification technology]. Hahn, Steve; Isserow, Saul; Ray, Ranjan (Boston Res. Dev., Gillette Co., Boston, MA, 02106, USA). Journal of Materials Science, 22(9), 3395-401 (English) 1987. CODEN: JMTSAS. ISSN: 0022-2461.

AB Two com. pptn.-hardening (PH) **stainless steels** were modified with 2.64-2.86 Ti and 1.2-1.3% B via RST and powder metallurgy (PM). The alloys exhibited improved **tensile** and yield **strengths** over their com. PH **stainless steel** counterparts at room and elevated temps. Ductility improvements at elevated temps. were obsd. The improved mech. properties were due to extremely fine microstructures stabilized by a fine dispersion of boride phases.

IT **37222-71-2**, Custom 450
(sintering of pptn.-hardenable powd., rapid solidification for)

RN 37222-71-2 HCA

CN Iron alloy, base, Fe 72-79,Cr 14.00-16.00,Ni 5.00-7.00,Cu 1.25-1.75,Mo 0.50-1.00,Mn 0-1.00,Si 0-1.00,Nb 0.4,C 0-0.05,P 0-0.030,S 0-0.030 (UNS S45000) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	72 - 79	7439-89-6
Cr	14.00 - 16.00	7440-47-3
Ni	5.00 - 7.00	7440-02-0
Cu	1.25 - 1.75	7440-50-8
Mo	0.50 - 1.00	7439-98-7
Mn	0 - 1.00	7439-96-5
Si	0 - 1.00	7440-21-3
Nb	0.4	7440-03-1
C	0 - 0.05	7440-44-0
P	0 - 0.030	7723-14-0
S	0 - 0.030	7704-34-9

CC 55-8 (Ferrous Metals and Alloys)
ST boride pptn hardening **stainless steel**; titanium boron **stainless** pptn hardening; rapid solidified **stainless steel** boride; powder metallurgy **stainless steel** boride
IT Casting process
(rapid solidification, of **stainless steel**, sintered microstructure and properties in relation to)
IT 7440-32-6, Titanium, uses and miscellaneous 7440-42-8, Boron, uses and miscellaneous
(alloying with, of pptn.-hardenable **stainless steel**, sintered)
IT 12597-68-1
(casting process, rapid solidification, of **stainless steel**, sintered microstructure and properties in relation to)
IT **37222-71-2**, Custom 450 39344-65-5 111619-56-8, Markomet 1480 111619-57-9, Markomet 1483
(sintering of pptn.-hardenable powd., rapid solidification for)

L131 ANSWER 19 OF 34 HCA COPYRIGHT 2003 ACS
106:21615 Effect of microalloying with rare earths and beryllium on the structure and properties of maraging **stainless steel** 00Cr12Ni9Cu2TiNb. Chen, Fumin; Li, Guojun; Yao, Jiaxin; Gao, Houxiu; Xu, Qingchi; Qin, Shiqi (Dep. Mater. Sci. Technol., Tianjin Univ., Tianjin, Peop. Rep. China). Tianjin Daxue Xuebao (3), 23-32 (Chinese) 1986. CODEN: TCHHA9. ISSN: 0493-2137.
AB Addn. of trace rare earths and Be decreased the **grain size** of original austenite and lath martensite, changed the substructure of martensite, pptd. globular NiBe, and delayed the strengthening process in the initial aging stage. The mech. properties and corrosion resistance of maraging **stainless steel** 00Cr12Ni9Cu2TiNb [**37222-72-3**] were improved.
IT **37222-72-3**, 00Cr12Ni9Cu2TiNb
(structure and properties of maraging, effect of microalloying

with beryllium and rare earth metals on)
RN 37222-72-3 HCA
CN Iron alloy, base, Fe 72-79,Cr 11.00-12.50,Ni 7.50-9.50,Cu 1.50-2.50,Ti 0.80-1.40,Nb 0.10-0.50,Mn 0-0.50,Mo 0-0.50,Si 0-0.50,C 0-0.05,P 0-0.040,S 0-0.030 (UNS S45500) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	72 - 79	7439-89-6
Cr	11.00 - 12.50	7440-47-3
Ni	7.50 - 9.50	7440-02-0
Cu	1.50 - 2.50	7440-50-8
Ti	0.80 - 1.40	7440-32-6
Nb	0.10 - 0.50	7440-03-1
Mn	0 - 0.50	7439-96-5
Mo	0 - 0.50	7439-98-7
Si	0 - 0.50	7440-21-3
C	0 - 0.05	7440-44-0
P	0 - 0.040	7723-14-0
S	0 - 0.030	7704-34-9

CC 55-8 (Ferrous Metals and Alloys)
ST **stainless steel** structure rare earth beryllium; maraging **stainless steel** rare earth beryllium
IT Rare earth metals, properties
(in maraging **stainless steel**, structure and properties in relation to)
IT 7440-41-7, properties
(in maraging **stainless steel**, structure and properties in relation to)
IT **37222-72-3**, 00Cr12Ni9Cu2TiNb
(structure and properties of maraging, effect of microalloying with beryllium and rare earth metals on)

L131 ANSWER 20 OF 34 HCA COPYRIGHT 2003 ACS
103:199412 Ferritic-austenitic duplex **stainless steel**
. Yoshitake, Akira; Kuhara, Akio; Ishii, Toshiaki (Kubota, Ltd. , Japan). Eur. Pat. Appl. EP 151487 A2 19850814, 36 pp. DESIGNATED STATES: R: DE, FR, GB, NL, SE. (English). CODEN: EPXXDW. APPLICATION: EP 1985-101255 19850206. PRIORITY: JP 1984-21388 19840207; JP 1984-21389 19840207.
AB **Stainless steel** [**99227-65-3**] resistant to stress corrosion cracking (esp. in petroleum-related applications) contains C .ltoreq.0.08, Cr 19-30, Mn 0.2-2, Mo 1-5, Ni 3-9, Si 0.2-2, Cu 0.5-3, Co 0.2-4, and N 0.05-0.35. The microstructure contains 30-70 area % of .**delta**.-**ferrite** phase by adjusting the Ni content to 3-8% at Cr content 19-24, or 4-9 at 24-30%. Resistant to corrosion is improved by N, which serves to distribute Cr and Mo to the austenitic phase in duplex microstructure. Yield strength is >55 kg/cmm2 with ductility and toughness, owing to the alloying with Co. The

stainless steel is suitable for tubing and couplings for oil wells, as well as for a linepipe showing a good weldability. Thus, stainlss **steel** [99247-69-5] contg. C 0.023, Cr 21.5, Mn 0.64, Mo 3.08, Ni 5.21, Si 0.67, Cu 1.05, Co 0.97, and N 0.18 showed ferrite 47 area%, yield strength 58.5 kg/mm2, **tensile strength** 79.8, elongation 36.4% Brinell hardness 205, and impact toughness (**Charpy** notched test at 0.degree.) 18.7 kg-m. Corrosion was negligible in a pitting test with aq. FeCl3 (**ASTM** G 48-A), and was 1.01 g/m2-h in crevice corrosion test (**ASTM** G48-B).

IT **99227-65-3**
(austenite-ferrite duplex, corrosion resistance of high-strength)

RN 99227-65-3 HCA

CN Iron alloy, base, Fe 44-76,Cr 19-30,Ni 3-9,Mo 1-5,Co 0.2-4,Cu 0.5-3,Mn 0.2-2,Si 0.2-2,N 0-0.4,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	44	-	76	7439-89-6
Cr	19	-	30	7440-47-3
Ni	3	-	9	7440-02-0
Mo	1	-	5	7439-98-7
Co	0.2	-	4	7440-48-4
Cu	0.5	-	3	7440-50-8
Mn	0.2	-	2	7439-96-5
Si	0.2	-	2	7440-21-3
N	0	-	0.4	17778-88-0
C	0	-	0.1	7440-44-0

IC ICM C22C038-52
ICS C22C038-42; C22C038-44

CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 51

ST **stainless steel** pipe petroleum duplex; ferrite austenite **stainless steel**

IT Petroleum wells
(**stainless steel** for equipment in, austenite-ferrite duplex structure of corrosion-resistant)

IT Pipes and Tubes
(**stainless steel** for, austenitic-ferritic duplex structure of weldable high-strength)

IT 12427-24-6
(austenite and, **stainless steel** with duplex structure of, high strength of weldable)

IT **99227-65-3**
(austenite-ferrite duplex, corrosion resistance of high-strength)

IT 12244-31-4, properties
(ferrite and, **stainless steel** with duplex structure of, high strength of weldable)

IT 7705-08-0, properties
(**stainless steel** resistant to aq. soln.,

duplex structure of)

L131 ANSWER 21 OF 34 HCA COPYRIGHT 2003 ACS
102:82604 High-alloy **stainless steels** with excellent hot workability. (Nippon Steel Corp., Japan). Jpn. Kokai Tokkyo Koho JP 59182956 A2 19841017 Showa, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1983-58200 19830402.

AB The **steels** contain C 0.005-0.3, Si .ltoreq.5, Mn .ltoreq.8, P .ltoreq.0.04, Cr 15-35, Ni 5-40, N 0.01-0.5, .gtoreq.1 of Al and Ti 0.01-0.1, of Ca and Ce 0.001-0.03%, S .ltoreq.30, and O .ltoreq.50 ppm, optionally .gtoreq.1 of Mo .ltoreq.5.5, Cu .ltoreq.3, Nb, V .ltoreq.1 each, W .ltoreq.2, Zr .ltoreq.0.5, and Sn .ltoreq.0.1% but calcd. .delta. = 3(Cr + 1.5Si + Mo) - 2.8(Ni + 0.5Mn + 0.5Cu) - 84(C + N) - 19.8 .gtoreq.-10 and S + O - 0.8Ca - 0.3Ce .ltoreq.40 ppm, and are continuously cast. No defects were obsd. on a continuously cast and hot-rolled thick strip and the wt. loss was .ltoreq.8.2 mg/cm2 in 5% FeCl3-0.05N HCl at 50.degree. after 48 h. Thus, a **stainless steel** [94766-34-4] contg. C 0.16, Si 0.77, Mn 2.1, P 0.017, Cr 22.5, Ni 13.1, N 0.071, Al 0.031%, S 10, O 38, and Ca 20 ppm had . **delta.-ferrite** -7.87% (>-10) and S+O-0.8Ca-0.3Ce 32 ppm (.ltoreq.40) and wt. loss 7.2 mg/cm2, and was defect-free vs. -7.68, 103, 10.9, with a comparable compn. but 55 ppm S and 48 ppm O without Ca.

IT **94786-03-5**
(hot formability of austenitic, high-purity)

RN 94786-03-5 HCA

CN Iron alloy, base, Fe 23-75,Cr 18-32,Ni 5.6-26,Mn 0.7-7.6,Si 0.3-4.1,Mo 0-3.1,Cu 0-1.3,W 0-0.7,V 0-0.5,N 0.1-0.4,C 0.1-0.3,Nb 0-0.3,Zr 0-0.3,Sn 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	23	-	75	7439-89-6
Cr	18	-	32	7440-47-3
Ni	5.6	-	26	7440-02-0
Mn	0.7	-	7.6	7439-96-5
Si	0.3	-	4.1	7440-21-3
Mo	0	-	3.1	7439-98-7
Cu	0	-	1.3	7440-50-8
W	0	-	0.7	7440-33-7
V	0	-	0.5	7440-62-2
N	0.1	-	0.4	17778-88-0
C	0.1	-	0.3	7440-44-0
Nb	0	-	0.3	7440-03-1
Zr	0	-	0.3	7440-67-7
Sn	0	-	0.1	7440-31-5

IC C22C038-58
CC 55-3 (Ferrous Metals and Alloys)
ST continuous casting **stainless steel**;

stainl ss steel hot formability
IT Casting process
(continuous, of manganese **stainless steel**, hot formability in relation to)
IT 94766-34-4 **94786-03-5**
(hot formability of austenitic, high-purity)

L131 ANSWER 22 OF 34 HCA COPYRIGHT 2003 ACS
100:125084 Austenitic **stainless steel**. (Sumitomo Metal Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 58167726 A2 19831004 Showa, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1982-50494 19820329.
AB Austenitic **stainless steels** contg. .gtoreq.1 of Ti 0.15-0.5 and Nb 0.3-1.5 wt.% are finish heated at 1100-1350, cooled, cold-worked with .gtoreq.20% redn., heat-treated at 1070-1300.degree. which is .gtoreq.30.degree. lower than the final heating temp., and cooled at a higher cooling rate than air cooling. The austenitic **stainless steels** have fine grain structure, high creep strength, and good corrosion resistance and are useful for boiler tubes. Thus, an austenitic **stainless steel** [89234-53-7] contg. C 0.07, Si 0.55, Mn 1.61, P 0.026, S 0.002, Cr 18.60, Ni 12.35, Nb 0.74, B 0.0013 wt.% was melted in a high-frequency induction furnace. After forging and hot-rolling at 1150-950.degree., the **steel** was cold-rolled to a 10 mm-thick plate. The plate was heated finally at 1250.degree., cold-rolled with 30% redn., and heat-treated at 1200.degree.. The plate had **grain size** **ASTM** No. 7.5 and creep-rupture strength 11.0 kg/mm2 after 5000 h at 700.degree..
IT **89234-52-6**
(creep of austenitic, niobium alloying effect on)
RN 89234-52-6 HCA
CN Iron alloy, base, Fe 34-73,Ni 11-32,Cr 15-24,Cu 0-3,Mo 0-2.6,Mn 0.8-1.9,Nb 0-1.2,Si 0.4-1,C 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	34	-	73	7439-89-6
Ni	11	-	32	7440-02-0
Cr	15	-	24	7440-47-3
Cu	0	-	3	7440-50-8
Mo	0	-	2.6	7439-98-7
Mn	0.8	-	1.9	7439-96-5
Nb	0	-	1.2	7440-03-1
Si	0.4	-	1	7440-21-3
C		0.1		7440-44-0

IC C21D008-00; B21B003-00; C22C038-58
CC 55-3 (Ferrous Metals and Alloys)
ST austenite **stainless steel** niobium
IT **89234-52-6** 89234-53-7

(creep of austenitic, niobium alloying effect on)

L131 ANSWER 23 OF 34 HCA COPYRIGHT 2003 ACS
96:56198 Polishable high-strength acid-resistant **steel**.
Giflo, Henrik (Hung.). Hung. Teljes HU 19635 O 19810328, 13 pp. (Hungarian). CODEN: HUXXBU. APPLICATION: HU 1977-GI263 19771201.

AB Title **stainless steels** contain C .ltoreq.2, Si .ltoreq.1, Mn .ltoreq.5, Cr .gtoreq.12, Ni .ltoreq.24, Cu .ltoreq.4, Mo .ltoreq.3, Nb 0.04-1.5, B 0.001-0.03, N .gtoreq.0.01, Al 0.02-0.2, Ca .gtoreq.0.001, Zr and/or Ce 0.036-0.25, V and/or Be 0.04-1.5%. Thus, **steel** [**80455-22-7**] contg. C 0.12, Si 0.69, Mn 0.53, Cr 13.4, Ni 0.21, Cu 0.27, Mo 0.18, Nb 0.093, B 0.0018, N 0.03, Al 0.12, Ca 0.0037, Ce 0.07, Zr 0.037, V 0.045, and Be 0.07% had **tensile strength**, elongation, and area redn. inthe as-rolled or heat-treated condition (500.degree., 90 min, air cooling) 1116 or 1288 N/mm2, 16 or 18%, and 50 or 60%, resp. The **ASTM grain size** was 11 or 10 after annealing 60 min at 1000 or 1200.degree., resp. The corrosion loss in synthetic pickling soln. of the meat industry (NaCl 323.4, KNO3 6.6 g, and H2O 1000 mL) at 20.degree. after 30 days was 2.9, vs. 2.3 g/m2 for austenitic 18-8 **stainless steel**, indicating similar corrosion resistance at only 13.4% Cr content.

IT **80455-21-6**
(corrosion resistance of polishable, acid resistance with high strength for)

RN 80455-21-6 HCA

CN Iron alloy, base, Fe 65-85,Cr 13-18,Ni 0.1-7.8,Mo 0.1-2.2,C 0.1-2,Mn 0.7-1.6,Si 0.2-0.9,Cu 0.1-0.3,Al 0.1,Nb 0.1,V 0.1,Be 0-0.1,Ce 0-0.1,N 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	65 - 85	7439-89-6
Cr	13 - 18	7440-47-3
Ni	0.1 - 7.8	7440-02-0
Mo	0.1 - 2.2	7439-98-7
C	0.1 - 2	7440-44-0
Mn	0.7 - 1.6	7439-96-5
Si	0.2 - 0.9	7440-21-3
Cu	0.1 - 0.3	7440-50-8
Al	0.1	7429-90-5
Nb	0.1	7440-03-1
V	0.1	7440-62-2
Be	0 - 0.1	7440-41-7
Ce	0 - 0.1	7440-45-1
N	0 - 0.1	17778-88-0

IT **80455-22-7**
(corrosion resistance of polishable, in acid meat-pickling soln.)

RN 80455-22-7 HCA

CN Iron alloy, base, Fe 85,Cr 13,Si 0.7,Al 0.5,Mn 0.5,Cu 0.3,Mo 0.2,Ni 0.2,Be 0.1,C 0.1,Ce 0.1,Nb 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	85	7439-89-6
Cr	13	7440-47-3
Si	0.7	7440-21-3
Al	0.5	7429-90-5
Mn	0.5	7439-96-5
Cu	0.3	7440-50-8
Mo	0.2	7439-98-7
Ni	0.2	7440-02-0
Be	0.1	7440-41-7
C	0.1	7440-44-0
Ce	0.1	7440-45-1
Nb	0.1	7440-03-1

IC C22C038-40
CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 17
ST **stainless steel** strength corrosion; polishing
stainless steel acid resistance
IT Polishing
(of **stainless steel**, acid-resistant high-strength)
IT Meat
(processing of, **stainless steels** for, acid-resistant high-strength polishable)
IT 7440-42-8, uses and miscellaneous 7440-67-7, uses and miscellaneous 7440-70-2, uses and miscellaneous
(alloying with, of acid-resistant high-strength **stainless steel**, polishing in relation to)
IT **80455-21-6**
(corrosion resistance of polishable, acid resistance with high strength for)
IT **80455-22-7**
(corrosion resistance of polishable, in acid meat-pickling soln.)

L131 ANSWER 24 OF 34 HCA COPYRIGHT 2003 ACS
96:38995 Structural changes in complexly alloyed **steels** with 12% chromium during the welding thermal cycle. Ul'yanova, N. V.; Kurnosova, N. D. (Mosk. Vyssh. Tekh. Uchil., Moscow, USSR). Metallovedenie i Termicheskaya Obrabotka Metallov (8), 46-8, 2 plates (Russian) 1981. CODEN: MTOMAX. ISSN: 0026-0819.
AB Microstructural changes during welding steam pipelines of martensitic-ferritic **steels** 12Kh11V2MF [37246-26-7] and 18Kh12VMBFR [**39294-27-4**] were studied. Heating to 1100-1150 or 1250-1300.degree. resulted in austenite grain growth or growth of .**delta**.-**ferrite** grains and formation of saw-type boundaries, resp. The **tensile**

strength of the heat-affected zone of **steel** 18Kh12VMBFR increased by 147 MPa by increasing the **annealing temp**. from 900 to 1300.degree. followed by normalization. The ductility decrease was insignificant, whereas the impact toughness decreased from 1.39 to 0.7 mJ/m2. The latter value was sufficiently high to meet the std. requirements.

IT **39294-27-4**
(welding of martensitic-ferritic, for pipelines, microstructure in relation to)

RN 39294-27-4 HCA

CN Iron alloy, base, Fe 83-88,Cr 11.0-13.0,W 0.40-0.70,Mo 0.40-0.60,Ni 0-0.60,Mn 0-0.50,Si 0-0.50,Nb 0.20-0.40,V 0.15-0.30,Cu 0-0.30,C 0.15-0.22,Ti 0-0.20,P 0-0.030,S 0-0.025,B 0-0.003 (18Kh12VMBFR) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	83	-	88	7439-89-6
Cr	11.0	-	13.0	7440-47-3
W	0.40	-	0.70	7440-33-7
Mo	0.40	-	0.60	7439-98-7
Ni	0	-	0.60	7440-02-0
Mn	0	-	0.50	7439-96-5
Si	0	-	0.50	7440-21-3
Nb	0.20	-	0.40	7440-03-1
V	0.15	-	0.30	7440-62-2
Cu	0	-	0.30	7440-50-8
C	0.15	-	0.22	7440-44-0
Ti	0	-	0.20	7440-32-6
P	0	-	0.030	7723-14-0
S	0	-	0.025	7704-34-9
B	0	-	0.003	7440-42-8

CC 55-9 (Ferrous Metals and Alloys)

ST welding **stainless steel** microstructure; pipeline steam **stainless steel** welding

IT Welding
(of **stainless steel**, for steam pipelines microstructure in relation to)

IT Pipelines and Pipe systems
(steam, welding of martensitic-ferritic **stainless steel**, microstructure in relation to)

IT 37246-26-7 **39294-27-4**
(welding of martensitic-ferritic, for pipelines, microstructure in relation to)

L131 ANSWER 25 OF 34 HCA COPYRIGHT 2003 ACS

93:30021 Fatigue testing of precipitating **steel** 1745 (custom 455) with machining as the final process. Larsson, Nils (Struct. Dep., Aeronaut. Res. Inst., Stockholm, Swed.). Report, FFA-TN-HU-1965, 35 pp. Avail. NTIS From: Sci. Tech. Aerosp. Rep.

1980, 18(2), Abstr. No. N80-11221 (English) 1979.

AB Results from fatigue testing of turned specimens of a pptn.-hardened **steel** are presented. The specimens were either plain or notched (K = 2.5 and 4 notch factor) with machining as the final process. The fatigue testing was carried out with R -1 (stress ratio) and .sigma.min .apprx.300 N/mm. Supplementary static tests were performed. The ultimate **tensile strength** for plain specimens was 1612 N/mm. The fatigue results are presented as S-N (stress-cycle no.) curves and are also revised to Haig diagrams. Notch fatigue factors (Kf) were calcd.

IT **37222-72-3**
(fatigue of pptn.-hardened, machining effect on)

RN 37222-72-3 HCA

CN Iron alloy, base, Fe 72-79,Cr 11.00-12.50,Ni 7.50-9.50,Cu 1.50-2.50,Ti 0.80-1.40,Nb 0.10-0.50,Mn 0-0.50,Mo 0-0.50,Si 0-0.50,C 0-0.05,P 0-0.040,S 0-0.030 (UNS S45500) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	72	-	79	7439-89-6
Cr	11.00	-	12.50	7440-47-3
Ni	7.50	-	9.50	7440-02-0
Cu	1.50	-	2.50	7440-50-8
Ti	0.80	-	1.40	7440-32-6
Nb	0.10	-	0.50	7440-03-1
Mn	0	-	0.50	7439-96-5
Mo	0	-	0.50	7439-98-7
Si	0	-	0.50	7440-21-3
C	0	-	0.05	7440-44-0
P	0	-	0.040	7723-14-0
S	0	-	0.030	7704-34-9

CC 55-8 (Ferrous Metals and Alloys)

ST fatigue pptn hardening **stainless steel**

IT **37222-72-3**
(fatigue of pptn.-hardened, machining effect on)

L131 ANSWER 26 OF 34 HCA COPYRIGHT 2003 ACS

92:11028 Seawater corrosion of fasteners in various structural materials. Hack, Harvey P. (David W. Taylor Nav. Ship Res. Dev. Cent., Annapolis, MD, 21402, USA). MCIC Rep., MCIC-79-40, Proc. 1978 Tri-Serv. Conf. Corros., 273-300 (English) 1979. CODEN: MCIRAZ. ISSN: 0099-8370.

AB Six-month const.-immersion seawater exposures were conducted on panels with 1/4-in bolts inserted with and without bolt sealant. Five panel materials were tested: fiberglass, Al 5456-H117 [12675-82-0], HY-130 **steel** [**37286-23-0**], Ti-6Al-4V [12743-70-3], and 17-4PH **stainless steel** [12611-80-2]. The 7 bolt materials were: Al 2024 [12616-84-1], chromated **ASTM** grade **5** **steel**, **stainless steels** 304

[11109-50-5] and 316 [11107-04-3], A286 **stainless steel** [12671-82-8], MP35N multiphase [12646-94-5], and Ti-6Al-4V. The sealant material was a two-part synthetic rubber material. For fiberglas structures is const. salt-water immersion, titanium, MP35N, A286, and 316 **stainless steel** fasteners with sealant performed well in these tests. The 5456 aluminum panels in similar environments sustained localized corrosion regardless of the bolt material. HY-130 **steel** structures in const. immersion performed adequately with properly sealed titanium, MP35N, A286, 304, or 316 **stainless steel** fasteners. Only titanium and MP35N fasteners performed well in titanium structures. The 17-4PH **stainless steel** structures suffered crevice corrosion with MP35N, A286, and 304 **stainless steel** fasteners. Attack on 17-4PH panels was erratic and intense with all bolt materials. It sometimes occurred as tunneling several inches from the bolt, leaving the bolt unaffected.

IT **37286-23-0**
(corrosion of hydrofoil structural material of, in presence of bolts, by seawater)

RN 37286-23-0 HCA

CN Iron alloy, base, Fe 92-94,Ni 4.8-5.2,Mn 0.6-0.9,Cr 0.4-0.7,Mo 0.3-0.6,Si 0.2-0.4,Cu 0-0.2,C 0-0.1,V 0-0.1 (HY 130) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	92	-	94	7439-89-6
Ni	4.8	-	5.2	7440-02-0
Mn	0.6	-	0.9	7439-96-5
Cr	0.4	-	0.7	7440-47-3
Mo	0.3	-	0.6	7439-98-7
Si	0.2	-	0.4	7440-21-3
Cu	0	-	0.2	7440-50-8
C	0	-	0.1	7440-44-0
V	0	-	0.1	7440-62-2

CC 61-7 (Water)
Section cross-reference(s): 55, 56

IT 12611-80-2 12675-82-0 12743-70-3 **37286-23-0**
(corrosion of hydrofoil structural material of, in presence of bolts, by seawater)

L131 ANSWER 27 OF 34 HCA COPYRIGHT 2003 ACS

86:58576 VK-A171/A271 - new cast **stainless steels** for suction roll shells. Murakami, S.; Akamatsu, K.; Morichika, T.; Yoshimitsu, A.; Hiraishi, H. (Steel Cast. Res. Dep., Kubota, Ltd., Osaka, Japan). Conf. Pap. - Eng. Conf. (TAPPI), Volume 1, 5-18. Tech. Assoc. Pulp Pap. Ind.: Atlanta, Ga. (English) 1976. CODEN: 34LGA8.

AB Two new **steels** were developed VK-A171 [58439-50-2]

(corresponding to a modification of **ASTM** CF8M contg. C 0.08, Mn 1.5, P .ltoreq. 0.03, S .ltoreq. 0.03, Si 2, Cr 20-6, Ni 6-10, and Mo 2% and VK-A271 [**58439-49-9**] contg. C 0.10, Mn 1.5, P .ltoreq. 0.03, S .ltoreq. 0.03, Si 2, Cr 24-30, Ni 5, Mo 1, and Cu 1%. The cast microstructure consists of austenite and . **delta.-ferrite**. VK-A171 has ferrite in an austenite matrix, while VK-A271 has austenite in a ferrite matrix. The .sigma. phase, formed by inadequate (too low a temp.) heat treatment, forms preferentially in the ferrite phase and accelerates shell failure. The increase in corrosion fatigue strength is due to lowering of the passivation c.d. The largest shell (of VK-A171) has 1.408 m outside diam. and 10.102 m length.

IT **58439-49-9**
(for suction roll shells)

RN 58439-49-9 HCA

CN Iron alloy, base, Fe,C,Cr,Cu,Mn,Mo,Ni,Si (VK-A271) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	60 - 76	7439-89-6
Cr	24 - 30	7440-47-3
Ni	0 - 5	7440-02-0
Si	0 - 2	7440-21-3
Mn	0 - 1.5	7439-96-5
Cu	0 - 1	7440-50-8
Mo	0 - 1	7439-98-7
C	0 - 0.1	7440-44-0

CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 43

ST **stainless steel** suction roll shell

IT Paper
(suction roll shells, **stainless steel** for)

IT **58439-49-9** 58439-50-2
(for suction roll shells)

L131 ANSWER 28 OF 34 HCA COPYRIGHT 2003 ACS

85:147722 Seawater corrosion of fasteners in various structural materials. Hack, Harvey P. (David W. Taylor Nav. Ship Res. Dev. Cent., Bethesda, MD, USA). U. S. NTIS, AD Rep., AD-A022885, 34 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1976, 76(11), 128 (English) 1976. CODEN: XADRCH.

AB Const.-immersion seawater exposures were conducted on panels with 0.25 in. bolts inserted with and without bolt sealant. Five panel materials were tested; fiber glass 5456-H117 Al alloy [12675-82-0], HY-130 [**37286-23-0**] **steel**, Ti-6Al-4V [12743-70-3] Ti alloy, and 17-4PH **stainless steel** [12611-80-2]. The seven bolt materials were: 2024 Al alloy [12616-84-1], anodized **ASTM** grade **5** **steel**, 304 and 316 **stainless steels**, A

286 [12671-82-8] **stainless steel**, MP35N [12646-94-5] multiphase, and Ti-6Al-4V Ti alloy. The sealant material was Coast ProSeal 800/B-2.

IT **37286-23-0**
(corrosion of fasteners of, by seawater)

RN 37286-23-0 HCA

CN Iron alloy, base, Fe 92-94,Ni 4.8-5.2,Mn 0.6-0.9,Cr 0.4-0.7,Mo 0.3-0.6,Si 0.2-0.4,Cu 0-0.2,C 0-0.1,V 0-0.1 (HY 130) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	92 - 94	7439-89-6
Ni	4.8 - 5.2	7440-02-0
Mn	0.6 - 0.9	7439-96-5
Cr	0.4 - 0.7	7440-47-3
Mo	0.3 - 0.6	7439-98-7
Si	0.2 - 0.4	7440-21-3
Cu	0 - 0.2	7440-50-8
C	0 - 0.1	7440-44-0
V	0 - 0.1	7440-62-2

CC 56-8 (Nonferrous Metals and Alloys)

ST aluminum alloy seawater corrosion; titanium alloy seawater corrosion; **steel** seawater corrosion; fiber glass seawater corrosion

IT 11107-04-3 11109-50-5 12611-80-2 12616-84-1 12646-94-5 12671-82-8 12675-82-0 12743-70-3 **37286-23-0**
(corrosion of fasteners of, by seawater)

L131 ANSWER 29 OF 34 HCA COPYRIGHT 2003 ACS

85:97690 Heat-resistant **steel** good in cold press-working for bolts of a thermal reactor. Kusaka, Kunio; Sekine, Tomio; Akita, Mitsumasa (Tokushu Seiko Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 50149517 19751129 Showa, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1974-57782 19740524.

AB The title **steel** [**60225-33-4**] contains C 0.05-0.40, Si 0.01-3.0, Mn 0.1-3.0, P 0.05-0.35, Ni 8-20, Cr 16-25, Cu 0.3-3.0, Mo, W 0.1-1.0 each, Nb 0.05-0.50, and B 0.0005-0.020%, and is soft after soln. treatment for cold heading to a bolt, pptn.-hardened to Rockwell C hardness >27, high in strength both a room and high temp., and oxidn.-resistant. The 0.2%-offset yield strength was 69.0-71.0, **tensile strength** 102-5 kg/mm2, elongation 25.5-27.5%, rupture strength after 100 hr at 700.degree., 760.degree., and 800.degree. 27.5-28.0, 17.2-17.4, and 12.3-12.5 kg/mm2, resp., and increase in wt. after 100 hr at 900.degree. 8.0-8.3 g/m2.

IT **60225-33-4**
(heat-resistant, for thermal reactor bolts)

RN 60225-33-4 HCA

CN Iron alloy, base, Fe 43-75,Cr 16-25,Ni 8-20,Cu 0.3-3,Mn 0.1-3,Si

0-3,Mo 0.1-1,W 0.1-1,Nb 0-0.5,C 0-0.4,P 0-0.4 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	43	-	75	7439-89-6
Cr	16	-	25	7440-47-3
Ni	8	-	20	7440-02-0
Cu	0.3	-	3	7440-50-8
Mn	0.1	-	3	7439-96-5
Si	0	-	3	7440-21-3
Mo	0.1	-	1	7439-98-7
W	0.1	-	1	7440-33-7
Nb	0	-	0.5	7440-03-1
C	0	-	0.4	7440-44-0
P	0	-	0.4	7723-14-0

IC C22C; F02B; C21D
CC 55-3 (Ferrous Metals and Alloys)
ST **stainless steel** heat resistant bolt; thermal reactor bolt
IT Bolts
(**stainless steel**, heat-resistant, for thermal reactors)
IT Reactors
(thermal, heat-resistant **stainless steel** bolts for)
IT **60225-33-4**
(heat-resistant, for thermal reactor bolts)

L131 ANSWER 30 OF 34 HCA COPYRIGHT 2003 ACS
84:168408 Stress corrosion cracking behavior of newer iron-chromium-nickel alloys at 550.degree. in high purity water. Clarke, W. L.; Danko, J. C.; Gordon, G. M. (Gen. Electr. Co., San Jose, CA, USA). Corros. Probl. Energy Convers. Gener., [Pap. Symp.], 410-22. Editor(s): Tedmon, Craig S., Jr. Electrochem. Soc.: Princeton, N. J. (English) 1974. CODEN: 32DCAA.
AB Seventeen com. **steels** were evaluated for boiling water-reactor applications. They include ferritic, martensitic, austenitic, and austenitic-ferritic **stainless steels**; each being characterized by compn., microstructure, and mech. properties. Stress corrosion-cracking tests were performed in 550.degree.F, high-purity water contg. 36 ppm O on uniaxial tensile specimens stressed at 75% of the 550.degree.F ultimate **tensile strength**. Tests were continued, for 5000 hr or failure, whichever occurred first. Post-test metallog. was performed on the failed specimens. The 17 alloys were classified as most resistant in the mill-annealed and the annealed and furnace-cooled conditions (5); had not failed, but data limited (3); of intermediate resistance (4); and least resistant (3). The ranking was obtained by using a very severe screening test, but still tentative regarding acceptance or

rejection for structural applications.

IT **37222-71-2**
(stress-corrosion cracking of, in high-purity water)

RN 37222-71-2 HCA

CN Iron alloy, base, Fe 72-79,Cr 14.00-16.00,Ni 5.00-7.00,Cu 1.25-1.75,Mo 0.50-1.00,Mn 0-1.00,Si 0-1.00,Nb 0.4,C 0-0.05,P 0-0.030,S 0-0.030 (UNS S45000) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	72 - 79	7439-89-6
Cr	14.00 - 16.00	7440-47-3
Ni	5.00 - 7.00	7440-02-0
Cu	1.25 - 1.75	7440-50-8
Mo	0.50 - 1.00	7439-98-7
Mn	0 - 1.00	7439-96-5
Si	0 - 1.00	7440-21-3
Nb	0.4	7440-03-1
C	0 - 0.05	7440-44-0
P	0 - 0.030	7723-14-0
S	0 - 0.030	7704-34-9

CC 56-8 (Nonferrous Metals and Alloys)
Section cross-reference(s): 71

ST stress corrosion resistant alloy; **steel** stress corrosion resistance; nickel alloy stress corrosion; reactor **steel** corrosion resistance

IT Nuclear reactors
(boiling water, stress-corrosion cracking of nickel alloys and **steels** for, in high-purity water)

IT 11121-96-3 12611-78-8 12724-48-0 12725-20-1 12745-19-6
37222-71-2 37270-63-6 39303-37-2 39418-84-3
54385-90-9 54428-61-4 55178-63-7 56508-08-8 59093-41-3
59220-28-9 59220-29-0 59220-30-3
(stress-corrosion cracking of, in high-purity water)

L131 ANSWER 31 OF 34 HCA COPYRIGHT 2003 ACS

83:14263 **Stainless steel**. Noguchi, Sakae; Abo, Hideo; Ueda, Masanori (Nippon Steel Corp.). Ger. Offen. DE 2421604 19741114, 11 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1974-2421604 19740504.

AB **Stainless steel** of high resistance to pitting corrosion and good hot-workability contains C 0.01-0.16, Si 0.15-3.11, Mn 0.9-4.40, Cr 16.3-25.2, Ni 6.8-31.0, Mo 0.001-5.0, N 0.02-0.40, Al 0.016-0.051, and Ca 0.0021-0.013% and is free of coarse nonmetallic inclusions. Thus, a **steel** contg. C 0.01, Si 0.66, Mn 1.16, Cr 22.1, Ni 14.4, Mo 1.0, N 0.40, Al 0.018, and Ca 0.0021%, melted in elec. furnace, had decreased pitting loss in 50 g FeCl3/l. and 1/20 N HCl at 50.degree. for 58 hr, length of nonmetallic inclusions <10 mm, no cracks in hot-working, and **tensile strength** 34 hbar at 800.degree. as

compared to >10 times the pitting corrosion, >30 corner cracks, and 26 hbar, resp., for a **steel** contg. Al 0.004, Ca 0.0005, and Nb 0.022%.

IT **55431-13-5**
(pitting corrosion-resistant hot-formable)

RN 55431-13-5 HCA

CN Iron alloy, base, Fe 1-81,Cr 15-35,Ni 3.5-35,Mn 0.1-10,Si 0.1-6,Mo 0-6,Cu 0.1-4,Nb 0.1-2,N 0-0.5,B 0-0.2,C 0-0.2,Al 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	1 - 81	7439-89-6
Cr	15 - 35	7440-47-3
Ni	3.5 - 35	7440-02-0
Mn	0.1 - 10	7439-96-5
Si	0.1 - 6	7440-21-3
Mo	0 - 6	7439-98-7
Cu	0.1 - 4	7440-50-8
Nb	0.1 - 2	7440-03-1
N	0 - 0.5	17778-88-0
B	0 - 0.2	7440-42-8
C	0 - 0.2	7440-44-0
Al	0 - 0.1	7429-90-5

IC C22C

CC 55-3 (Ferrous Metals and Alloys)

ST **stainless steel** hot formability; pitting corrosion **stainless steel**

IT 7429-90-5, uses and miscellaneous 7440-70-2, uses and miscellaneous
(in corrosion-resistant **steels**, hot-formable)

IT 55431-12-4 **55431-13-5** 55431-14-6
(pitting corrosion-resistant hot-formable)

L131 ANSWER 32 OF 34 HCA COPYRIGHT 2003 ACS

79:95539 Effect of the welding heating cycle on a change in the structure and phase composition of chromium-nickel-titanium **steel** OKh21N5T in the weld-joint heat-affected zone. Melkumov, S. B. (USSR). Svarochnoe Proizvodstvo (6), 12-14 (Russian) 1973. CODEN: SVAPAI. ISSN: 0491-6441.

AB The kinetics of grain growth and changes in the proportions of ferritic and austenitic phases in the heat-affected zone (HAZ) of welds in **steel** 0Kh21N5T were investigated in relation to the heat input (900-3000 cal/cm2) during welding. The **grain size** in the HAZ depends on the heat input and on the max. temp. reached; it is scarcely affected by the Ti-C ratio in the **steel**. Evidence of grain refining due to pptn. of . **delta**.-**ferrite** was obsd. in the regions heated at >1400.degree.; this occurs regardless of the heat input. With heat inputs >2400 cal/cm2, the grain refining extended to the low-temp.

regions of the HAZ. The extent of the changes in structure of the **steel** in the HAZ decreased with decreasing heat input and Ti-C ratio.

IT **12661-77-7**
(welding of, heat input in, grain growth and phases in relation to)

RN 12661-77-7 HCA

CN Iron alloy, base, Fe 68-74,Cr 21.0-23.0,Ni 5.30-6.30,Mn 0-0.80,Si 0-0.80,Ti 0-0.65,Cu 0-0.30,Mo 0-0.30,W 0-0.20,C 0-0.08,P 0-0.035,S 0-0.025 (08Kh22N6T) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	68	-	74	7439-89-6
Cr	21.0	-	23.0	7440-47-3
Ni	5.30	-	6.30	7440-02-0
Mn	0	-	0.80	7439-96-5
Si	0	-	0.80	7440-21-3
Ti	0	-	0.65	7440-32-6
Cu	0	-	0.30	7440-50-8
Mo	0	-	0.30	7439-98-7
W	0	-	0.20	7440-33-7
C	0	-	0.08	7440-44-0
P	0	-	0.035	7723-14-0
S	0	-	0.025	7704-34-9

CC 55-10 (Ferrous Metals and Alloys)

ST welding chromium nickel **steel**; grain growth **stainless** welding; structure transformation **stainless** welding

IT Welds
(grain growth and phases in **stainless steel**, heat input in relation to)

IT Welding
(of chromium-nickel **steel**, heat input in, grain growth and phases in relation to)

IT 7440-32-6, properties
(grain growth and phases in **stainless steel** welds contg.)

IT **12661-77-7**
(welding of, heat input in, grain growth and phases in relation to)

L131 ANSWER 33 OF 34 HCA COPYRIGHT 2003 ACS

79:8628 **Stainless** nickel-chromium **steel**. Jones, Robin Mackay F. (International Nickel Ltd.). Ger. Offen. DE 2246001 19730322, 27 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1972-2246001 19720920.

AB The title **steel** with good die-castability at .ltoreq. 1455.degree., high strength, ductility, and corrosion resistance contained C 0.063-0.096, Ni 8.0-25.7, Cr 14.0-25.6, Si 2.45-4.25, Mn

1.8-19.9, B 0.33-1.3, Cu 1.47-2.58, Mo 0-6.5, and P 0-1.3%. Thus, a **steel** contg. C 0.064, Ni 8.3, Cr 15.9, Si 2.5, Mn 17.4, B 0.39, and Cu 2.08%, sand-cast at 1425.degree., had 0.2%-yield point 24.9 and 23.0 cb, **tensile strength** 54.8 and 56.4 cb, elongation 17.0 and 27.0%, necking 17.0 and 25.5%, notch toughness 12.3 and 24.2 J in cast state and after soln. heat treatment at 1093.degree. for 1 hr, resp., and good corrosion resistance.

IT **39351-94-5**
(**stainless**, for die casting)

RN 39351-94-5 HCA

CN Iron alloy, base, Fe 4-78,Ni 6-30,Cr 14-26,Mn 0-20,Mo 0-8,Si 2-5,Cu 0-3,B 0.3-1.4,P 0-1.4,Nb 0-1,C 0-0.2 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	4	-	78	7439-89-6
Ni	6	-	30	7440-02-0
Cr	14	-	26	7440-47-3
Mn	0	-	20	7439-96-5
Mo	0	-	8	7439-98-7
Si	2	-	5	7440-21-3
Cu	0	-	3	7440-50-8
B	0.3	-	1.4	7440-42-8
P	0	-	1.4	7723-14-0
Nb	0	-	1	7440-03-1
C	0	-	0.2	7440-44-0

IC C22C

CC 55-3 (Ferrous Metals and Alloys)

ST **steel stainless**; nickel chromium **steel** ; die casting **stainless steel**

IT **39351-94-5** 39351-95-6
(**stainless**, for die casting)

L131 ANSWER 34 OF 34 HCA COPYRIGHT 2003 ACS

64:50147 Original Reference No. 64:9335g-h A new high-strength **stainless** [**steel**] suitable for cryogenic use.
Myers, Lewis P.; Goda, Kermit J., Jr. (Stainless Steel Res., Carpenter Steel Co., Reading, PA). Cryog. Technol., 1(6), 261-4 (English) 1965.

AB A new pptn.-hardenable corrosion-resistant **steel** alloy known as Custom 455 (C 0.007, Mn 0.001, Si 0.01, Cr 11.33, Ni 8.76, Cu 1.55, Ti 1.29, Nb 0.36, B 0.0023%, and the balance Fe), has been introduced for cryogenic, aircraft and missile, and general industrial applications. It shows 15% higher **tensile strength** at -300.degree.F. than at room temp., retains 70 to 80% of room temp. ductility at -300.degree.F., and maintains high strength at elevated temps. to 900.degree.F. Custom 455 also shows improved ductility and toughness in large sections, excellent corrosion resistance, ease of fabrication, and simplicity of heat

carbon is too low

treatment.
IT **37222-72-3**, Custom 455
(for cryogenics)
RN 37222-72-3 HCA
CN Iron alloy, base, Fe 72-79,Cr 11.00-12.50,Ni 7.50-9.50,Cu 1.50-2.50,Ti 0.80-1.40,Nb 0.10-0.50,Mn 0-0.50,Mo 0-0.50,Si 0-0.50,C 0-0.05,P 0-0.040,S 0-0.030 (UNS S45500) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	72 - 79	7439-89-6
Cr	11.00 - 12.50	7440-47-3
Ni	7.50 - 9.50	7440-02-0
Cu	1.50 - 2.50	7440-50-8
Ti	0.80 - 1.40	7440-32-6
Nb	0.10 - 0.50	7440-03-1
Mn	0 - 0.50	7439-96-5
Mo	0 - 0.50	7439-98-7
Si	0 - 0.50	7440-21-3
C	0 - 0.05	7440-44-0
P	0 - 0.040	7723-14-0
S	0 - 0.030	7704-34-9

CC 19 (Ferrous Metals and Alloys)
IT Cryogenics
(**stainless steel** for)
IT 12597-68-1, **Stainless steel 37222-72-3**
, Custom 455
(for cryogenics)

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FILE 'HCA' ENTERED AT 16:20:04 ON 24 JAN 2003
SEL L132 1-37 HIT RN
SEL L133 1-35 HIT RN

FILE 'REGISTRY' ENTERED AT 16:23:36 ON 24 JAN 2003
L134 74 S E1-E76
L135 64 S L134 AND 0.03-0.5 C/MAC
L136 1 S L135 AND 1<= NB/MAC
L137 1 S L135 AND 1-100 NB/MAC
L138 0 S L135 AND 2-100 NB/MAC
L139 1 S L135 AND 0.5-100 NB/MAC
L140 24 S L135 AND 0.1-100 NB/MAC

FILE 'HCA' ENTERED AT 16:29:03 ON 24 JAN 2003
L141 302 S L140
L142 17 S L132 AND L141
L143 0 S L133 AND L141

=> d l142 1-17 cbib abs hitstr hitind

L142 ANSWER 1 OF 17 HCA COPYRIGHT 2003 ACS
137:250821 Steel pipes with excellent formability and their manufacture. Sakamoto, Shinya; Terada, Yoshio; Sakuma, Koji; Shiota, Kosaku; Yoshinaga, Naoki; Fujita, Nobuhiro; Itami, Atsushi (Nippon Steel Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2002275577 A2 20020925, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-73348 20010315.

AB The pipes consist of C 0.08-0.25, Si 0.001-1.5, Mn 0.01-2.0, P 0.001-0.06, Al 0.008-0.2, N 0.001-0.007, S .ltoreq.0.05 wt.%, and balance Fe, have av. **grain size** .gtoreq.5 .mu.m, and satisfy r* .gtoreq.1.2, where r* = ln(C0/C) .div. ln(C .times. L/C0 .times. L0), C0 (mm) is periphery of steel pipe before testing, C (mm) is that after testing, L0 (mm) is the distance between evaluation points in longitudinal direction at each peripheral positions before testing, and L is that after testing. Optionally, the pipes may also contain Cr 0.05-10, Ni 0.05-20, Cu 0.05-20, Mo 0.05-1.0, Co 0.05-1.0, W 0.05-1.0, Sn 0.05-1.0, Zr 0.0001-0.5, Mg 0.0001-0.5, Ti 0.001-0.2, Nb 0.001-0.2, V 0.001-0.2, B 0.0001-0.01, and/or Ca 0.0001-0.01 wt.%. The pipes are manufd. from steel having the said compn. by finishing hot rolling at a temp. equal or above (Ar3 - 50.degree.), coiling at .ltoreq.700.degree., cold rolling at .gtoreq.25% and <70% draft, heating at av. ratio 4-200.degree./h, **annealing** at max. **temp**. 600-800.degree., and cooling at 5-100.degree./h. The pipes are esp. suitable for hydroforming.

IT **461005-43-6**
(manuf. of steel pipes suitable for hydroforming)

RN 461005-43-6 HCA

CN Iron alloy, base, Fe 40-100,Cu 0-20,Ni 0-20,Cr 0-10,Mn 0-2,Si 0-1.5,Co 0-1,Mo 0-1,Sn 0-1,W 0-1,Mg 0-0.5,Zr 0-0.5,C 0.1-0.2,Al 0-0.2,Nb 0-0.2,Ti 0-0.2,V 0-0.2,P 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	40	-	100	7439-89-6
Cu	0	-	20	7440-50-8
Ni	0	-	20	7440-02-0
Cr	0	-	10	7440-47-3
Mn	0	-	2	7439-96-5
Si	0	-	1.5	7440-21-3
Co	0	-	1	7440-48-4
Mo	0	-	1	7439-98-7
Sn	0	-	1	7440-31-5
W	0	-	1	7440-33-7
Mg	0	-	0.5	7439-95-4
Zr	0	-	0.5	7440-67-7
C	0.1	-	0.2	7440-44-0
Al	0	-	0.2	7429-90-5

Nb	0	-	0.2	7440-03-1
Ti	0	-	0.2	7440-32-6
V	0	-	0.2	7440-62-2
P	0	-	0.1	7723-14-0

IC ICM C22C038-00
ICS C22C038-00; B21B003-00; C21D009-46; C22C038-06; C22C038-60
CC 55-3 (Ferrous Metals and Alloys)
IT 11102-29-7, processes 12716-40-4, processes 12724-44-6, processes 12730-39-1, processes 39308-59-3, processes 53740-50-4, processes 58317-37-6, processes 68202-73-3, processes 443636-77-9, processes 443636-79-1, processes **461005-43-6**
(manuf. of steel pipes suitable for hydroforming)

L142 ANSWER 2 OF 17 HCA COPYRIGHT 2003 ACS
137:204323 Properties and ASME code approval of P92 and P122 forgings. Masuyama, F. (Mitsubishi Heavy Industries, Ltd., UK). Advances in Materials Technology for Fossil Power Plants, Proceedings of the Conference, 3rd, Swansea, United Kingdom, Apr. 5-6, 2001, 239-247. Editor(s): Viswanathan, R.; Bakker, W. T.; Parker, J. D. Institute of Materials: London, UK. ISBN: 1-86125-145-9 (English) 2001. CODEN: 69CXVZ.
AB NF616 and HCM12A have been designated as T92/P92 and T122/P122 resp. for tubes and pipes in ASME/**ASTM**, and approved as Code Case 2179 for P92 and Code Case 2180 for P122 by ASME for use in Section I construction. Efforts to collect data for forgings of both steels have revealed that the forgings exhibit almost the same properties as tubes and pipes except for a slight difference in the creep strength of P92. Data packages for both steels (including time independent properties and creep properties) produced by the steel manufacturers, Nippon Steel and Sumitomo Metal, were submitted to the ASME Boiler and Pressure Vessel Code Committee to obtain approval for the inclusion of forgings into the above-mentioned Code Cases. This paper presents the material properties characterization of the as-received and fabricated forgings, as well as the circumstances and discussion at the committee to include forgings into the existing Code Cases 2179 and 2180.
IT **146147-39-9**, P122
(properties and ASME code approval of P92 and P122 steel forgings)
RN 146147-39-9 HCA
CN Iron alloy, base, Fe,C,Cr,Cu,Mn,Mo,Nb,Ni,Si,V,W (HCM12A) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	82	-	84	7439-89-6
Cr	10	-	11	7440-47-3
W	1.9	-	2.4	7440-33-7
Cu	0.9	-	2	7440-50-8

Ni	0.1	-	1.2	7440-02-0
Mn	0.5	-	0.6	7439-96-5
Mo	0.3	-	0.4	7439-98-7
V		0.2		7440-62-2
C		0.1		7440-44-0
Nb	0	-	0.1	7440-03-1
Si	0	-	0.1	7440-21-3

CC 55-3 (Ferrous Metals and Alloys)
IT Boiler pipes
Breaking strength
Creep
Elongation, mechanical
Forging
Fracture (materials)
Hardness (mechanical)
Impact strength
Microstructure
Tensile strength
Welding of metals
Yield strength
(properties and ASME code approval of P92 and P122 steel forgings)
IT 138410-99-8, P92 **146147-39-9**, P122
(properties and ASME code approval of P92 and P122 steel forgings)

L142 ANSWER 3 OF 17 HCA COPYRIGHT 2003 ACS
137:204322 Production and properties for all product forms of 0.1C-12Cr-2W-Cu-V-Nb steel (grade 122) for fossil power generation. Sawaragi, Yoshiatsu; Miyata, Kaori; Iseda, Atsuro; Masuyama, Fujimitsu; Komai, Nobuyoshi; Yokoyama, Tomomitsu (Sumitomo Metal Industries Limited, UK). Advances in Materials Technology for Fossil Power Plants, Proceedings of the Conference, 3rd, Swansea, United Kingdom, Apr. 5-6, 2001, 209-218. Editor(s): Viswanathan, R.; Bakker, W. T.; Parker, J. D. Institute of Materials: London, UK. ISBN: 1-86125-145-9 (English) 2001. CODEN: 69CXVZ.
AB A new high-strength 0.1C-12Cr-2W-Cu-V-Nb steel (Grade 122:HCM12A) has been jointly developed by Sumitomo Metal Industries and Mitsubishi Heavy Industries for advanced USC(Ultra Super Crit.) boilers and has been already approved by the ASME Boiler and Pressure Vessel Code Committee for use in Section 1 construction as Code Case 2180. Various product forms, such as pipes, forgings, plates and tubes have been manufd. and evaluated in terms of mech. properties and corrosion resistance. The allowable tensile stress of Grade 122 steel has been about 1.3 times higher than that of modified 9Cr-1Mo steel (T91/P91) due to substituting W for a part of Mo and bearing a slight amt. of B. The high temp. corrosion resistance of the steel has been superior to T91/P91 with 9mass% Cr. The redn. in Cr-equiv., which is accomplished by addn. of Cu, has suppressed **delta-ferrite** formation. As a result, the steel has sufficient toughness for large diam. and thick

walled components. In order to investigate the practical performance of Grade 122 steel tubes, the field exposure tests have been conducted in a Japanese utility power boiler. The superheater and reheater tubes exposed 3 yr have shown that there have been no significant changes in microstructures except for pptn. of Laves phase during exposure. A slight degrdn. in mech. properties has been obsd. It is thus concluded that the Grade 122 steel is widely applicable for advanced USC boiler materials.

IT **146147-39-9**, HCM12A
(prodn. and properties for all product forms of 0.1C-12Cr-2W-Cu-V-Nb steel (grade 122) for fossil power generation)

RN 146147-39-9 HCA

CN Iron alloy, base, Fe,C,Cr,Cu,Mn,Mo,Nb,Ni,Si,V,W (HCM12A) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	82 - 84	7439-89-6
Cr	10 - 11	7440-47-3
W	1.9 - 2.4	7440-33-7
Cu	0.9 - 2	7440-50-8
Ni	0.1 - 1.2	7440-02-0
Mn	0.5 - 0.6	7439-96-5
Mo	0.3 - 0.4	7439-98-7
V	0.2	7440-62-2
C	0.1	7440-44-0
Nb	0 - 0.1	7440-03-1
Si	0 - 0.1	7440-21-3

CC 55-3 (Ferrous Metals and Alloys)

IT Aging, materials
Boiler pipes
Breaking strength
Creep
Forging
Impact strength
Microstructure
Tensile strength
Thermal fatigue
Thermal resistance
(prodn. and properties for all product forms of 0.1C-12Cr-2W-Cu-V-Nb steel (grade 122) for fossil power generation)

IT **146147-39-9**, HCM12A
(prodn. and properties for all product forms of 0.1C-12Cr-2W-Cu-V-Nb steel (grade 122) for fossil power generation)

L142 ANSWER 4 OF 17 HCA COPYRIGHT 2003 ACS

135:183750 High-strength cold-rolled steel sheet having good stretch

flanging property and its manufacture. Kawabe, Hidenao; Shimizu, Tetsuo; Furukimi, Osamu (Kawasaki Steel Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2001226741 A2 20010821, 11 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-36757 20000215.

AB The steel sheet contains C 0.05-0.15, Si 0.05-0.50, Mn 2.5-3.5, P .ltoreq.0.02, S .ltoreq.0.0035, Al .ltoreq.0.1, Ti .gtoreq.0.001 and <0.05, and Nb 0.005-0.08 mass% and has av. **grain size** .ltoreq.5.0 .mu.m bainite .gtoreq.80%, **tensile strength** (TS) .gtoreq.780 MPa, strength-elongation balance TS .times. El .gtoreq.19,000 MPa%, and strength-expanding rate balance TS .times. .lambda. .gtoreq.74,000 MPa. Optionally, the steel sheet contains (1) Cr 0.01-0.5, Cu 0.01-1.0, Ni 0.01-1.0, Mo 0.01-1.0, V 0.01-0.3, Zr 0.01-0.3, and/or B 0.0001-0.005 and (2) Ca 0.0001-0.005 and/or rare earth metals 0.0001-0.005 mass%. The sheet is manufd. from a slab having the above compn. by hot rolling at 1050-1250.degree. with final temp. (FDT) 850-950.degree., cooling within 0.5 s after final hot rolling at cooling rate .gtoreq.30.degree./s, coiling at 350-550.degree., cold rolling, continuously **annealing** at **temp**. between Ac3 point and Ac3 point + 100.degree., and then rapid cooling at .gtoreq.40.degree./s and <100.degree./s to 200-400.degree.. The sheet is esp. suitable for automotive door impact beams and bumpers.

IT **354761-49-2**
(high-strength cold-rolled steel manufd. by rolling, annealing, and rapid cooling for stretch flanging property)

RN 354761-49-2 HCA

CN Iron alloy, base, Fe 92-98,Mn 2.5-3.5,Cu 0-1,Mo 0-1,Ni 0-1,Cr 0-0.5,Si 0-0.5,V 0-0.3,Zr 0-0.3,C 0-0.2,Al 0-0.1,Nb 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	92	-	98	7439-89-6
Mn	2.5	-	3.5	7439-96-5
Cu	0	-	1	7440-50-8
Mo	0	-	1	7439-98-7
Ni	0	-	1	7440-02-0
Cr	0	-	0.5	7440-47-3
Si	0	-	0.5	7440-21-3
V	0	-	0.3	7440-62-2
Zr	0	-	0.3	7440-67-7
C	0	-	0.2	7440-44-0
Al	0	-	0.1	7429-90-5
Nb	0	-	0.1	7440-03-1

IC ICM C22C038-00
ICS C21D009-46; C22C038-14; C22C038-58

CC 55-11 (Ferrous Metals and Alloys)

IT 116067-99-3, processes 171876-42-9, processes 354761-43-6 354761-44-7 354761-45-8, processes 354761-46-9 354761-47-0 354761-48-1 **354761-49-2**

(high-strength cold-rolled steel manufd. by rolling, annealing, and rapid cooling for stretch flanging property)

L142 ANSWER 5 OF 17 HCA COPYRIGHT 2003 ACS
134:74374 Microstructural evolution of a 12Cr-2W-Cu-V-Nb steel during three-year service exposure. Miyata, Kaori; Sawaragi, Yoshiatsu; Okada, Hirokazu; Masuyama, Fujimitsu; Yokoyama, Tomomitsu; Komai, Nobuyoshi (Corporate Research & Development, Sumitomo Metal Industries, LTD, Hyogo, 660-0891, Japan). ISIJ International, 40(11), 1156-1163 (English) 2000. CODEN: IINTEY. ISSN: 0915-1559. Publisher: Iron and Steel Institute of Japan.

AB Microstructural evolution of 12Cr-2W-Cu-V-Nb steel tubes (ASME SA213-T122) after one-year and three year service exposure tests in a Japanese practical boiler was investigated from a standpoint of the phase stability of ppts. The test tubes consist of tempered martensite and .**delta**.-**ferrite**, and the main ppts. are MX-type carbonitride, M23C6 carbide and Laves phase. TEM observations on thin films show that the MX has pptd. in a plate-shaped with a coherent or semi-coherent relation with the matrix inside grains. An estn. of the lattice misfit between MX and the matrix suggests that the coherent strain was high enough to enhance the shear stress and then strongly interact with dislocations. Another important point is that morphol. and compns. of MX were stable under the present service conditions, thereby the creep strength as well as **tensile strength** has kept high after long-term service exposure. The long-term exposure to the present service temp. has enhanced the pptn. of Fe2(W, Mo) Laves phase inside grains, resulting in a marked redn. in the dissolved W and Mo in matrix. It is found that the kinetics of W-partitioning between matrix and Laves phase can be successfully expressed by the Johnson-Mehl-Avrami type equation and applied to est. the actual temps. of the exposed tubes. It is concluded that the kinetics of Laves phase pptn. and morphol. of MX have mainly controlled a microstructural stability in the 12Cr-2W-Cu-V-Nb steel, and also give helpful suggestion to increase the creep resistance during the long-term service exposure.

IT **146147-39-9**, SA213-T122
(microstructural evolution of 12Cr-2W-Cu-V-Nb steel during three-year service exposure)

RN 146147-39-9 HCA

CN Iron alloy, base, Fe,C,Cr,Cu,Mn,Mo,Nb,Ni,Si,V,W (HCM12A) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	82	-	84	7439-89-6
Cr	10	-	11	7440-47-3
W	1.9	-	2.4	7440-33-7
Cu	0.9	-	2	7440-50-8
Ni	0.1	-	1.2	7440-02-0
Mn	0.5	-	0.6	7439-96-5

Mo	0.3	-	0.4	7439-98-7
V		0.2		7440-62-2
C		0.1		7440-44-0
Nb	0	-	0.1	7440-03-1
Si	0	-	0.1	7440-21-3

CC 55-8 (Ferrous Metals and Alloys)
IT Boilers
Crystal dislocations
Precipitation hardening
Shear stress
Tensile strength
(microstructural evolution of 12Cr-2W-Cu-V-Nb steel during three-year service exposure)
IT **146147-39-9**, SA213-T122
(microstructural evolution of 12Cr-2W-Cu-V-Nb steel during three-year service exposure)

L142 ANSWER 6 OF 17 HCA COPYRIGHT 2003 ACS
132:154818 Microstructural development and stability in new high strength steels for thick section applications at up to 620.degree.C. Nath, B.; Metcalfe, E.; Hald, J. (Engineering, National Power plc., Swindon, SN5 6PB, UK). Microstructure of High Temperature Materials, 1(Microstructural Development and Stability in High Chromium Ferritic Power Plant Steels), 123-143 (English) 1997. CODEN: MHTMFD. Publisher: Institute of Materials.
AB An international consortium of steelmakers, boiler manufacturers and power producers has developed and validated three new steels which offer almost 50% higher creep rupture strength than P91 at 600.degree.C after 105 h. Compns. of these 9-11 Cr steels are based around 1.8-2% W and 0.5% Mo and alloying addns. are optimized for the required combination of properties. Two of the three steels have obtained ASME code approval for use as thick section components at up to 620.degree.C. In the normalized and tempered condition all three martensitic steels exhibit ferrite laths with MC + M23C6 carbides and negligible amts. of **.delta.-ferrite** . Intermetallic Laves phase forms during aging at 600 and 650.degree.C. There is a concomitant decrease in the impact toughness although the tensile properties remain unaffected. By comparison, Laves phase pptn. does not occur in P91 above 600.degree.C. A thermodn. model has been developed which fully describes the pptn. of the Laves phase. Creep strengths of NF616 and HCM12A have been compared after two aging treatments: 650.degree.C for 10,000 h and 720.degree.C for 200 h. The former results in complete pptn. of Laves phase, prior to creep tests. By comparison, Laves phase does not form on aging at 720.degree.C but it does during long-term creep tests at lower temps. The 720.degree.C for 200 h specimens exhibit higher rupture strength than those aged at 650.degree.C. The results show that the pptn. of Laves phase during creep is the primary strengthening effect of W in 9-11% Cr steels and that any solid soln. strengthening is of secondary importance. Similar and dissimilar metal welds have been

made in both thin and thick section sizes, using different processes e.g. manual metal arc, submerged arc, and W-inert gas. The heat affected zone (HAZ) exhibits an unusually fine **grain size**, even adjacent to the fusion line, due to a transformation induced grain refinement. Beyond the inter-critically annealed zone (ICAZ) at the edge of the HAZ, there is a region of min. hardness which correspond to an over-tempered structure. At moderate to low stresses, creep rupture of cross-weld samples occur at the Type IV location.

IT **146147-39-9**, HCM12A
(microstructure development and stability in new high-strength steels for thick section applications at up to 620.degree.C)

RN 146147-39-9 HCA

CN Iron alloy, base, Fe,C,Cr,Cu,Mn,Mo,Nb,Ni,Si,V,W (HCM12A) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	82 - 84	7439-89-6
Cr	10 - 11	7440-47-3
W	1.9 - 2.4	7440-33-7
Cu	0.9 - 2	7440-50-8
Ni	0.1 - 1.2	7440-02-0
Mn	0.5 - 0.6	7439-96-5
Mo	0.3 - 0.4	7439-98-7
V	0.2	7440-62-2
C	0.1	7440-44-0
Nb	0 - 0.1	7440-03-1
Si	0 - 0.1	7440-21-3

CC 55-3 (Ferrous Metals and Alloys)

IT 138410-99-8, NF616 **146147-39-9**, HCM12A 194428-90-5, TB12M
(microstructure development and stability in new high-strength steels for thick section applications at up to 620.degree.C)

L142 ANSWER 7 OF 17 HCA COPYRIGHT 2003 ACS

128:6081 Heat treatment of castings from low-alloy steel for strength and toughness. Hewitt, Paul Herbert (Naco Inc., USA; Hewitt, Paul Herbert). PCT Int. Appl. WO 9740196 A1 19971030, 35 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1997-GB1024 19970415. PRIORITY: GB 1996-8108 19960419.

AB Molten steel contg. .ltoreq.0.2% C, total alloying <4%, and the C equiv. of 0.45-0.7 is cast, and the castings are cooled followed by

heat treatment with reheating to above the Ac3 (esp. 900-1100.degree.) for homogenizing, cooling to inter-crit. temp. between Ac3 and Ac1 (nominally 700-800.degree.), and **quenching** to room **temp**. The heat-treated cast steel typically shows the microstructure with retained austenite as well as acicular bainite, ferrite, and/or martensite with fine (size <1 .mu.m) spheroidized carbides. The heat-treated castings are weldable, and typically show **tensile strength** of 1200-1600 N/mm2, yield point .gtoreq.600 N/mm2, elongation 6-12%, and cold (-40.degree.) **Charpy** impact toughness 20-40 J. The low-alloy steels typically contain C 0.1-0.2, Mn 1-1.5, Si 0.30-0.65, Ni 0.3-0.6, Cr 0.3-0.6, Ti 0.02-0.10, Cu 0.5-1.0, V 0.10-0.19, Al 0.03-0.14, and W 0.10-0.5%. The steel casting are suitable for railway vehicle service.

IT **198884-23-0**
(cast; heat treatment of castings from low-alloy steel for strength and toughness)

RN 198884-23-0 HCA

CN Iron alloy, base, Fe 94-97,Mn 0.9-1.5,Cu 0.5-1,Cr 0.3-0.6,Ni 0.3-0.6,Si 0.3-0.6,W 0.1-0.5,C 0.1-0.2,V 0.1-0.2,Mo 0-0.2,Al 0-0.1,Nb 0-0.1,Ti 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	94 - 97	7439-89-6
Mn	0.9 - 1.5	7439-96-5
Cu	0.5 - 1	7440-50-8
Cr	0.3 - 0.6	7440-47-3
Ni	0.3 - 0.6	7440-02-0
Si	0.3 - 0.6	7440-21-3
W	0.1 - 0.5	7440-33-7
C	0.1 - 0.2	7440-44-0
V	0.1 - 0.2	7440-62-2
Mo	0 - 0.2	7439-98-7
Al	0 - 0.1	7429-90-5
Nb	0 - 0.1	7440-03-1
Ti	0 - 0.1	7440-32-6

IC ICM C21D001-18
ICS C21D001-19; C22C038-50

CC 55-5 (Ferrous Metals and Alloys)

IT 12597-69-2, Steel, uses **198884-23-0** 198884-24-1 198884-25-2 198884-26-3 198884-27-4
(cast; heat treatment of castings from low-alloy steel for strength and toughness)

L142 ANSWER 8 OF 17 HCA COPYRIGHT 2003 ACS

124:93880 Alloyed steels for tools and dies heat treated for controlled toughness using magnetization test. Nakai, Norihiko (Nippon Koshuha Steel Co., Ltd., Japan). U.S. US 5458703 A 19951017, 9 pp. Cont.-in-part of U.S. Ser. No. 813, 652, abandoned. (English).

CODEN: USXXAM. APPLICATION: US 1993-110925 19930824. PRIORITY: JP 1991-287364 19910622; JP 1991-287365 19910622; JP 1991-287366 19910622; US 1991-813652 19911227.

AB The tools and dies finished by quench hardening are manufd. from the alloy steels contg. C 0.15-1.5, Si .ltoreq.2.5, Mn .ltoreq.1.0, Cr 0.4-21, Mo .ltoreq.5.0, W .ltoreq.18, V .ltoreq.3.0, Co .ltoreq.21.0, Ni .ltoreq.18.0, Nb .ltoreq.1.25, Zr .ltoreq.1.25, Cu .ltoreq.2.0, Ti .ltoreq.2.5, Ta .ltoreq.1.25, B .ltoreq.0.010, N .ltoreq.0.50, Al .ltoreq.1.20, P .ltoreq.0.040, and S .ltoreq.0.040%. The quenched and tempered tool specimens are tested to det. their tempered hardness, magnetization (by Barkhausen noise), and **Charpy** impact toughness values, and to obtain a correlation of the toughness with the temp., hardness, and Barkhausen parameters in a math. model. The prodn. tools having the required toughness are obtained by adjusting the tempered hardness and/or the **quench**-hardening **temp**. based on calibration in the math. model. The tool specimens from Fe-0.45 C-5 Cr-1 Mo-0.5% V steel can be heat treated to Rockwell C-scale hardness of 43-51 by quenching from 990-1050.degree..

IT **172617-45-7**
(quench hardened; alloyed steels for tools and dies heat treated for controlled toughness using magnetization test)

RN 172617-45-7 HCA

CN Iron alloy, base, Fe 0-99,Cr 0.4-21,Co 0-21,Ni 0-18,W 0-18,Mo 0-5,V 0-3,Si 0-2.5,Ti 0-2.5,Cu 0-2,C 0.2-1.5,Al 0-1.2,Nb 0-1.2,Ta 0-1.2,Zr 0-1.2,Mn 0-1,N 0-0.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	0 - 99	7439-89-6
Cr	0.4 - 21	7440-47-3
Co	0 - 21	7440-48-4
Ni	0 - 18	7440-02-0
W	0 - 18	7440-33-7
Mo	0 - 5	7439-98-7
V	0 - 3	7440-62-2
Si	0 - 2.5	7440-21-3
Ti	0 - 2.5	7440-32-6
Cu	0 - 2	7440-50-8
C	0.2 - 1.5	7440-44-0
Al	0 - 1.2	7429-90-5
Nb	0 - 1.2	7440-03-1
Ta	0 - 1.2	7440-25-7
Zr	0 - 1.2	7440-67-7
Mn	0 - 1	7439-96-5
N	0 - 0.5	17778-88-0

IC ICM C21D009-00
NCL 148503000
CC 55-5 (Ferrous Metals and Alloys)
Section cross-reference(s): 77

IT **172617-45-7**
(quench hardened; alloyed steels for tools and dies heat treated for controlled toughness using magnetization test)

L142 ANSWER 9 OF 17 HCA COPYRIGHT 2003 ACS
120:12548 The microstructure and mechanical properties of two Navy HSLA-100 steels in plate form. Fox, A. G.; Mikalac, S.; Vassilaros, M. G. (Dep. Mech. Eng., U. S. Nav. Postgrad. Sch., Monterey, CA, 93943, USA). Fundam. Aging Tempering Bainitic Martensitic Steel Prod., Gilbert R. Speich Symp. Proc., 155-61. Editor(s): Krauss, George; Repas, Paul E. Iron Steel Soc.: Warrendale, Pa. (English) 1992. CODEN: 59DDAG.

AB The microstructures and mech. properties of Navy HSLA-100 steel and Navy HSLA-100 steel with increased copper (2.0% Cu) in plate form were examd. in detail after water quenching and **tempering** at various **temps**. between 399 and 621.degree.. Longitudinal tensile and L-T **Charpy** V-notch impact tests indicated that, with an appropriate temper, the HSLA-100 steel met the Navy specifications for 100 ksi yield strength steel plate. The increased copper HSLA-100 steel not only met the requirements for 100 ksi yield strength steel but also met all the Naval specifications for 130 ksi yield strength steel plate. Optical, scanning and transmission electron microscopy of the as-quenched steels revealed a microstructure of packets (size about 7 .mu.m) of lath martensite/bainitic ferrite with a small amt. of retained austenite; this is typical for ferritic steels of this carbon content. On aging, the microstructure of these steels appeared tempered in the usual way but was modified by the superposition of the pptn. effects of copper.

IT **115681-69-1**, HSLA100 **151687-39-7**, MS24645A
(microstructure and mech. properties of, for Navy applications)

RN 115681-69-1 HCA

CN Iron alloy, base, Fe 92-93,Ni 3.35-3.65,Cu 1.45-1.75,Mn 0.75-1.05,Cr 0.45-0.75,Mo 0.55-0.65,Si 0-0.40,Nb 0.02-0.06,C 0-0.06,V 0-0.03,Ti 0-0.02,P 0-0.020,S 0-0.006 (HSLA-100) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	92 - 93	7439-89-6
Ni	3.35 - 3.65	7440-02-0
Cu	1.45 - 1.75	7440-50-8
Mn	0.75 - 1.05	7439-96-5
Cr	0.45 - 0.75	7440-47-3
Mo	0.55 - 0.65	7439-98-7
Si	0 - 0.40	7440-21-3
Nb	0.02 - 0.06	7440-03-1
C	0 - 0.06	7440-44-0
V	0 - 0.03	7440-62-2
P	0 - 0.020	7723-14-0
Ti	0 - 0.02	7440-32-6
S	0 - 0.006	7704-34-9

RN 151687-39-7 HCA
CN Iron alloy, base, Fe,C,Cr,Cu,Mn,Mo,Nb,Ni,Si (MIL S-24645A) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	92 - 93	7439-89-6
Ni	3.4 - 3.6	7440-02-0
Cu	1.4 - 1.8	7440-50-8
Mn	0.8 - 1	7439-96-5
Cr	0.4 - 0.8	7440-47-3
Mo	0.6	7439-98-7
Si	0.4	7440-21-3
C	0.1	7440-44-0
Nb	0 - 0.1	7440-03-1

CC 55-12 (Ferrous Metals and Alloys)
IT **115681-69-1**, HSLA100 151613-39-7, HSLA100 Cu
151687-39-7, MS24645A
(microstructure and mech. properties of, for Navy applications)

L142 ANSWER 10 OF 17 HCA COPYRIGHT 2003 ACS
116:88673 High-strength chromium steel with oxidation resistance and weldability. Iseda, Atsuro; Sawaragi, Yoshiatsu (Sumitomo Metal Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 03097832 A2 19910423 Heisei, 10 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1989-235388 19890911.
AB The Cr steel contains C 0.03-0.15, Cr 8-14, Si .ltoreq.0.7, Mn 0.1-1.5, Ni .ltoreq.1, Mo 0.01-1.2, W 0.8-3.5, V 0.1-0.3, Nb 0.01-0.2, Al .ltoreq.0.05, Cu 1-5, and N 0.001-0.1%, optionally with B 0.0001-0.02 and La, Ce, Y, Ca, Ti, Zr, and/or Ta 0.01-0.2%. The steel with 1-40% .**delta**.-**ferrite** in the microstructure is suitable for boilers, nuclear reactor structures, and chem. plant app. Thus, the Cr steel (contg. C 0.12, Cr 12.03, Si 0.05, Mn 0.52, Ni 0.21, Mo 0.23, W 2.03, V 0.25, Nb 0.08, Al 0.021, Cu 1.09, N 0.025, P 0.012, and S 0.002%) showed hot (600.degree.) **tensile strength** 30.5 kg/mm2, yield strength 23.5 kg/mm2, and elongation 38.9%, as well as cold (0.degree.) fracture toughness of 18.5 kg-m/cm2 and creep strength at 650.degree. for 104 h of 9.2 kg/mm2.
IT **138671-65-5 138671-68-8 138671-70-2**
138671-71-3 138671-72-4 138671-73-5
138671-74-6 138671-75-7 138671-77-9
138699-15-7
(high-strength, with oxidn. resistance and weldability, for boilers and nuclear reactors)
RN 138671-65-5 HCA
CN Iron alloy, base, Fe 83,Cr 12,W 2.3,Cu 1.2,Mn 0.4,Mo 0.4,V 0.2,C 0.1,N 0.1,Nb 0.1,Ni 0.1,Si 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	83	7439-89-6
Cr	12	7440-47-3
W	2.3	7440-33-7
Cu	1.2	7440-50-8
Mn	0.4	7439-96-5
Mo	0.4	7439-98-7
V	0.2	7440-62-2
C	0.1	7440-44-0
N	0.1	17778-88-0
Nb	0.1	7440-03-1
Ni	0.1	7440-02-0
Si	0.1	7440-21-3

RN 138671-68-8 HCA
CN Iron alloy, base, Fe 84,Cr 11,W 1.8,Cu 1.6,Mn 0.5,Ni 0.3,V 0.2,C 0.1,Mo 0.1,N 0.1,Nb 0.1,Si 0.1,Ta 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	84	7439-89-6
Cr	11	7440-47-3
W	1.8	7440-33-7
Cu	1.6	7440-50-8
Mn	0.5	7439-96-5
Ni	0.3	7440-02-0
V	0.2	7440-62-2
C	0.1	7440-44-0
Mo	0.1	7439-98-7
N	0.1	17778-88-0
Nb	0.1	7440-03-1
Si	0.1	7440-21-3
Ta	0.1	7440-25-7

RN 138671-70-2 HCA
CN Iron alloy, base, Fe 82,Cr 11,W 3,Cu 2,Mn 0.5,Mo 0.2,Ni 0.2,Si 0.2,V 0.2,C 0.1,N 0.1,Nb 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	82	7439-89-6
Cr	11	7440-47-3
W	3	7440-33-7
Cu	2	7440-50-8
Mn	0.5	7439-96-5
Mo	0.2	7439-98-7
Ni	0.2	7440-02-0
Si	0.2	7440-21-3

V	0.2	7440-62-2
C	0.1	7440-44-0
N	0.1	17778-88-0
Nb	0.1	7440-03-1

RN 138671-71-3 HCA
CN Iron alloy, base, Fe 80,Cr 12,W 3.3,Cu 2.8,Mo 0.6,Mn 0.5,Ni 0.3,Si 0.2,V 0.2,C 0.1,N 0.1,Nb 0.1,Y 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	80	7439-89-6
Cr	12	7440-47-3
W	3.3	7440-33-7
Cu	2.8	7440-50-8
Mo	0.6	7439-98-7
Mn	0.5	7439-96-5
Ni	0.3	7440-02-0
Si	0.2	7440-21-3
V	0.2	7440-62-2
C	0.1	7440-44-0
N	0.1	17778-88-0
Nb	0.1	7440-03-1
Y	0.1	7440-65-5

RN 138671-72-4 HCA
CN Iron alloy, base, Fe 82,Cr 12,Cu 2.2,W 2.2,Mn 0.6,Mo 0.3,Ni 0.3,Si 0.3,V 0.2,C 0.1,N 0.1,Nb 0.1,Y 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	82	7439-89-6
Cr	12	7440-47-3
Cu	2.2	7440-50-8
W	2.2	7440-33-7
Mn	0.6	7439-96-5
Mo	0.3	7439-98-7
Ni	0.3	7440-02-0
Si	0.3	7440-21-3
V	0.2	7440-62-2
C	0.1	7440-44-0
N	0.1	17778-88-0
Nb	0.1	7440-03-1
Y	0.1	7440-65-5

RN 138671-73-5 HCA
CN Iron alloy, base, Fe 82,Cr 12,Cu 2.1,W 1.6,Mn 0.6,Mo 0.6,Ni 0.2,Si 0.2,V 0.2,C 0.1,Nb 0.1 (9CI) (CA INDEX NAME)

Component	Component	Component

	Percent	Registry Number
Fe	82	7439-89-6
Cr	12	7440-47-3
Cu	2.1	7440-50-8
W	1.6	7440-33-7
Mn	0.6	7439-96-5
Mo	0.6	7439-98-7
Ni	0.2	7440-02-0
Si	0.2	7440-21-3
V	0.2	7440-62-2
C	0.1	7440-44-0
Nb	0.1	7440-03-1

RN 138671-74-6 HCA
CN Iron alloy, base, Fe 84,Cr 12,W 2,Cu 1.1,Mn 0.5,Mo 0.2,Ni 0.2,V 0.2,C 0.1,Nb 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	84	7439-89-6
Cr	12	7440-47-3
W	2	7440-33-7
Cu	1.1	7440-50-8
Mn	0.5	7439-96-5
Mo	0.2	7439-98-7
Ni	0.2	7440-02-0
V	0.2	7440-62-2
C	0.1	7440-44-0
Nb	0.1	7440-03-1

RN 138671-75-7 HCA
CN Iron alloy, base, Fe 83,Cr 12,W 2.2,Cu 1.6,Mn 0.5,Mo 0.2,V 0.2,C 0.1,Nb 0.1,Ni 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	83	7439-89-6
Cr	12	7440-47-3
W	2.2	7440-33-7
Cu	1.6	7440-50-8
Mn	0.5	7439-96-5
Mo	0.2	7439-98-7
V	0.2	7440-62-2
C	0.1	7440-44-0
Nb	0.1	7440-03-1
Ni	0.1	7440-02-0

RN 138671-77-9 HCA
CN Iron alloy, base, Fe 81,Cr 12,Cu 3,W 1.8,Mn 0.6,Mo 0.6,Ni 0.2,V

0.2,C 0.1,N 0.1,Nb 0.1,Si 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	81	7439-89-6
Cr	12	7440-47-3
Cu	3	7440-50-8
W	1.8	7440-33-7
Mn	0.6	7439-96-5
Mo	0.6	7439-98-7
Ni	0.2	7440-02-0
V	0.2	7440-62-2
C	0.1	7440-44-0
N	0.1	17778-88-0
Nb	0.1	7440-03-1
Si	0.1	7440-21-3

RN 138699-15-7 HCA
CN Iron alloy, base, Fe 84,Cr 12,W 1.9,Cu 1.1,Mo 0.5,Mn 0.4,V 0.2,C 0.1,N 0.1,Nb 0.1,Ni 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	84	7439-89-6
Cr	12	7440-47-3
W	1.9	7440-33-7
Cu	1.1	7440-50-8
Mo	0.5	7439-98-7
Mn	0.4	7439-96-5
V	0.2	7440-62-2
C	0.1	7440-44-0
N	0.1	17778-88-0
Nb	0.1	7440-03-1
Ni	0.1	7440-02-0

IC ICM C22C038-00
ICS C22C038-48
CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 71
IT 138671-64-4 **138671-65-5** 138671-66-6 138671-67-7
138671-68-8 138671-69-9 **138671-70-2**
138671-71-3 138671-72-4 138671-73-5
138671-74-6 138671-75-7 138671-76-8
138671-77-9 138671-78-0 138671-79-1 138671-80-4
138671-81-5 138671-82-6 **138699-15-7**
(high-strength, with oxidn. resistance and weldability, for boilers and nuclear reactors)

L142 ANSWER 11 OF 17 HCA COPYRIGHT 2003 ACS
105:195422 Manufacture of steel rods with increased cold toughness.

Nakasato, Fukukazu; Adachi, Takahiko; Fujita, Michitaka; Kawamura, Eisuke; Kiyokoba, Susumu (Sumitomo Metal Industries, Ltd., Japan). Ger. Offen. DE 3545952 A1 19860710, 52 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1985-3545952 19851223. PRIORITY: JP 1984-274841 19841228; JP 1984-274842 19841228.

AB Steel rods are manufd. from ingots contg. C 0.04-0.08, Mn 1.8-2.0, Nb 0.030-0.07, Cu 0-0.25, Cr 0-0.80, B 0-0.0020, Si 0.20-0.30, Mo 0.30-0.40, Al 0.020-0.060, Ni 0-1.20, Ti 0-0.030%, P <0.010, and S <0.010%. The ingots are heated to .ltoreq.1000.degree. for hot rolling with >60% redn. between 880.degree. and a finishing temp. of .ltoreq.850.degree.. The rods are cooled at .gtoreq.3.degree./s to room **temp**., and optionally **annealed** at 500-700.degree.. The steel has a fine-grained structure of ferrite with 30-70% bainite and **grain size** .ltoreq.50.mu.. The resulting rods have high toughness and strength at subzero temps., and are useful in manuf. of reinforced concrete construction (e.g. tanks for liquefied fuel gases) in Arctic regions. Thus, the steel ingot (contg. C 0.03, Si 0.41, Mn 2.21, Mo 0.38, Nb 0.071, Al 0.021, P 0.021, and S 0.018%) was heated to 950.degree.; hot-rolled 90% from 880.degree. to a finishing temp. of 800.degree. as a bar of 25 mm diam.; and cooled to room temp. at 10.degree./s. The bars had yield strength 496 N/mm2, **tensile strength** 626 N/mm2, ductile-brittle transition temp. -136.degree., and impact toughness 290 N-m at -120.degree.. The corresponding values for a conventional steel were 335-468 N/mm2, 532-623 N/mm2, from -80 to -95.degree., and 8.8-29.4 N-m.

IT **105056-26-6 105056-28-8**
(mech. properties of cold-resistant, effect of hot rolling on)

RN 105056-26-6 HCA

CN Iron alloy, base, Fe 95-98,Mn 1.8-2,Ni 0-1.2,Cr 0-0.8,Mo 0.3-0.4,Si 0.2-0.3,Cu 0-0.2,Al 0-0.1,C 0-0.1,Nb 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	95 - 98	7439-89-6
Mn	1.8 - 2	7439-96-5
Ni	0 - 1.2	7440-02-0
Cr	0 - 0.8	7440-47-3
Mo	0.3 - 0.4	7439-98-7
Si	0.2 - 0.3	7440-21-3
Cu	0 - 0.2	7440-50-8
Al	0 - 0.1	7429-90-5
C	0 - 0.1	7440-44-0
Nb	0 - 0.1	7440-03-1

RN 105056-28-8 HCA

CN Iron alloy, base, Fe 96-98,Mn 1.1-2.5,Cr 0-1.1,Ni 0-1.1,Mo 0.2-0.5,Si 0-0.4,Cu 0-0.3,Al 0-0.1,C 0-0.1,Nb 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	96 - 98	7439-89-6
Mn	1.1 - 2.5	7439-96-5
Cr	0 - 1.1	7440-47-3
Ni	0 - 1.1	7440-02-0
Mo	0.2 - 0.5	7439-98-7
Si	0 - 0.4	7440-21-3
Cu	0 - 0.3	7440-50-8
Al	0 - 0.1	7429-90-5
C	0 - 0.1	7440-44-0
Nb	0 - 0.1	7440-03-1

IC ICM C21D008-08
ICS C22C038-04
CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 51
IT **105056-26-6** 105056-27-7 **105056-28-8**
(mech. properties of cold-resistant, effect of hot rolling on)

L142 ANSWER 12 OF 17 HCA COPYRIGHT 2003 ACS
104:92954 Effect of cooling rate and heat treatment on the chemical microheterogeneity of steel 09Kh16N4BL. Anastasiadi, G. P.; Kolchina, R. V.; Smirnova, L. N. (USSR). Metallovedenie i Termicheskaya Obrabotka Metallov (9), 35-7 (Russian) 1985. CODEN: MTOMAX. ISSN: 0026-0819.
AB Steel 09Kh16N4BL [**37245-17-3**], which is used for casting of high-loaded parts, is of the transition class and has the sorbitic structure with small amts. of **.delta.-ferrite** after the final heat treatment consisting of **quenching** and high-**temp tempering**. Distribution of **.delta.-ferrite** in the martensite matrix and proportion of alloying elements in structural components controls the mech. and service properties of steel parts. Cr segregation during solidification of steel castings controls the stability of **.delta.-ferrite**. Decreased chem. heterogeneity was obsd. in the parts cast with low cooling rates, even after heating to 1200-1300.degree. and water cooling.
IT **37245-17-3**
(thermal stability of, for high-loaded parts, cooling rate during casting effect on)
RN 37245-17-3 HCA
CN Iron alloy, base, Fe 77-81,Cr 15.0-16.5,Ni 4.00-4.50,Si 0-0.60,Mn 0-0.50,Cu 0-0.30,Mo 0-0.30,Ti 0-0.20,W 0-0.20,Nb 0.05-0.15,C 0.08-0.12,P 0-0.030,S 0-0.015 (09Kh16N4B) (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	77 - 81	7439-89-6
Cr	15.0 - 16.5	7440-47-3

Ni	4.00	-	4.50	7440-02-0
Si	0	-	0.60	7440-21-3
Mn	0	-	0.50	7439-96-5
Cu	0	-	0.30	7440-50-8
Mo	0	-	0.30	7439-98-7
Ti	0	-	0.20	7440-32-6
W	0	-	0.20	7440-33-7
Nb	0.05	-	0.15	7440-03-1
C	0.08	-	0.12	7440-44-0
P	0	-	0.030	7723-14-0
S	0	-	0.015	7704-34-9

CC 55-2 (Ferrous Metals and Alloys)
IT **37245-17-3**
(thermal stability of, for high-loaded parts, cooling rate during casting effect on)

L142 ANSWER 13 OF 17 HCA COPYRIGHT 2003 ACS
92:9677 Effects of niobium and vanadium contents on mechanical properties of controlled-rolled plates and their welded portions for X65-X80 line pipe. Shiga, Chiaki; Hatomura, Taneo; Tabata, Nobuhisa; Shiga, Atsushi; Kamada, Akio; Ohashi, Nobuo (Tech. Res. Lab., Kawasaki Steel Corp., Chiba, Japan). Kawasaki Seitetsu Giho, 10(1), 1-14 (Japanese) 1978. CODEN: KWSGBZ. ISSN: 0368-7236.
AB Nb and/or V contents .ltoreq.0.16% increased the **tensile strength** and decreased the **grain size** of rolled X65-X80 steel line pipe without lowering the impact transition temp. The Cu or Mn present accelerated pptn. of Nb or V nitrides and carbides, and also increased the strength. A Nb content of>0.06% decreased the **Charpy** impact toughness of welded joints.
IT **59231-63-9**, properties
(mech. properties of controlled rolled and welded, for pipelines, compn. effect on)
RN 59231-63-9 HCA
CN Iron alloy, base, Fe,C,Cr,Cu,Mn,Mo,Nb,Ni,Si,V (API X75) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	96	-	100	7439-89-6
Mn	0	-	1.8	7439-96-5
Si	0	-	0.6	7440-21-3
Mo	0	-	0.4	7439-98-7
Cr	0	-	0.3	7440-47-3
Ni	0	-	0.3	7440-02-0
C	0	-	0.2	7440-44-0
Cu	0	-	0.2	7440-50-8
Nb	0	-	0.1	7440-03-1
V	0	-	0.1	7440-62-2

CC 55-10 (Ferrous Metals and Alloys)
IT 57621-31-5, properties 58059-98-6, properties **59231-63-9**
, properties
(mech. properties of controlled rolled and welded, for pipelines, compn. effect on)

L142 ANSWER 14 OF 17 HCA COPYRIGHT 2003 ACS
91:110833 Effect of hot deformation and austenitizing on the **grain size** of steels 4Kh4VMFSSh and 45Kh3V3MFSSh.
Kryuchkov, V. I.; Kucheryavyi, V. I.; Ul'yanova, N. V. (Mosk. Vyssh. Tekh. Uchil., Moscow, USSR). Metallovedenie i Termicheskaya Obrabotka Metallov (6), 55-8 (Russian) 1979. CODEN: MTOMAX. ISSN: 0026-0819.
AB In steel 4Kh4VMFSSh [37203-00-2] with initial **grain size** of **ASTM** no. 2-3, austenite [12244-31-4] with **ASTM grain-size** no. 5.5-6 formed after 15-50% deformation at 1100-50.degree.. In steel 45Kh3V3MFSSh [**12741-69-4**] with initial **grain size** of **ASTM** no. 4-5 a uniform recrystn. structure with **grain size** no. 7.5-8.5 formed after 18-50% deformation at 1150-1200.degree. or after 50% deformation at 1100.degree.. At other temps. and deformation degrees the austenitic **grain size** remained either unchanged or become finer, but not in the entire metal vol.
IT **12741-69-4**
(**grain size** of, effect of hot working and austenitization on)
RN 12741-69-4 HCA
CN Iron alloy, base, Fe 88-91,W 3.00-3.60,Cr 2.50-3.20,V 1.50-1.80,Mo 0.80-1.10,Si 0.50-0.80,C 0.45-0.52,Mn 0.20-0.50,Ni 0-0.35,Cu 0-0.30,Nb 0.05-0.15,Ti 0-0.03,P 0-0.030,S 0-0.030 (5Kh3V3MFS) (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	88	-	91	7439-89-6
W	3.00	-	3.60	7440-33-7
Cr	2.50	-	3.20	7440-47-3
V	1.50	-	1.80	7440-62-2
Mo	0.80	-	1.10	7439-98-7
Si	0.50	-	0.80	7440-21-3
C	0.45	-	0.52	7440-44-0
Mn	0.20	-	0.50	7439-96-5
Ni	0	-	0.35	7440-02-0
Cu	0	-	0.30	7440-50-8
Nb	0.05	-	0.15	7440-03-1
P	0	-	0.030	7723-14-0
S	0	-	0.030	7704-34-9
Ti	0	-	0.03	7440-32-6

CC 55-7 (Ferrous Metals and Alloys)

ST steel hot working **grain size**; austenite hot working **grain size**
IT **12741-69-4** 37203-00-2
(**grain size** of, effect of hot working and austenitization on)
IT 12244-31-4, properties
(**grain size** of, effect of hot working on)

L142 ANSWER 15 OF 17 HCA COPYRIGHT 2003 ACS
89:183418 Effect of molybdenum and tungsten on long term creep rupture strength of 12% chromium heat-resisting steel containing vanadium, niobium and boron. Fujita, Toshio; Sato, Takaki; Takahashi, Norio (Fac. Eng., Univ. Tokyo, Tokyo, Japan). Transactions of the Iron and Steel Institute of Japan, 18(2), 115-24 (English) 1978. CODEN: TISJBB. ISSN: 0021-1583.
AB Addns. of .ltoreq.2% Mo and W in TAF [65216-56-0] heat-resisting steel were investigated to improve high-temp. strength. Creep rupture, hardness, metallog., and carbide phase anal. were detd. on quenched and tempered bar stock. The max. creep rupture strength was obsd. after adding 1.6 Mo, .gtoreq.1.7 W, or .apprx.1.6% (Mo + 0.5 W). Tempering hardness showed the same trend. Addns. of Mo and W strengthened the steel by promoting fine carbide ppts., but at higher alloying content the strength decreased with appearance of .**delta**.-**ferrite**. Creep rupture strength of modified TAF [68126-17-0] steel at 550-650.degree. and 103-105 h was higher than that of H46 [57208-89-6], and **ASTM** A565-616 [51835-85-9] steels.
IT **68126-16-9**
(creep rupture and microstructure of, carbide ppts. and ferrite in relation to)
RN 68126-16-9 HCA
CN Iron alloy, base, Fe 83-88,Cr 10-11,Mo 0-2,W 0-1.7,Mn 0.8-0.9,Si 0.3-0.6,C 0.2,Nb 0.2,V 0.2,Ni 0-0.2,Cu 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	83	-	88	7439-89-6
Cr	10	-	11	7440-47-3
Mo	0	-	2	7439-98-7
W	0	-	1.7	7440-33-7
Mn	0.8	-	0.9	7439-96-5
Si	0.3	-	0.6	7440-21-3
C		0.2		7440-44-0
Nb		0.2		7440-03-1
V		0.2		7440-62-2
Ni	0	-	0.2	7440-02-0
Cu	0	-	0.1	7440-50-8

CC 55-3 (Ferrous Metals and Alloys)
IT **68126-16-9**
(creep rupture and microstructure of, carbide ppts. and ferrite

in relation to)

L142 ANSWER 16 OF 17 HCA COPYRIGHT 2003 ACS
84:125328 Hot-rolled steel with improved low-temperature strength and toughness. Repas, Paul E. (USS Engineers and Consultants, Inc., USA). Ger. Offen. DE 2425624 19741219, 30 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1974-2425624 19740527.
AB Steel with yield strength .gtoreq.45.7 kg/mm2, extraordinary toughness at -17.8.degree., and transition temp. for 50% shear fracture, (fracture appearance transition temp. based on **ASTM** A 370-72a) to -62.degree. for pipes is prepd. by heating steel contg. C 0.05-0.1, P .ltoreq. 0.04, S .ltoreq.0.04, Mn 1-1.6, Mo 0.15-0.40, Nb 0.02-0.05, and V 0.02-0.05% above the upper crit. temp. for austenitization and soln. of carbides and nitrides, hot-rolling to .ltoreq.90% of the desired redn., cooling below the upper and above the lower crit. temp. with partial conversion of austenite to ferrite, and rolling at this temp. to 10-40% redn. Thus, steel [58428-02-7] billets contg. C 0.067, Mn 1.22, Mo 0.18, Nb [7440-03-1] 0.035, P 0.01, S 0.011-0.022, and N 0.004-0.007% were rolled in 14 passes to 12.7 mm with the 1st rolling at 1204.degree. and the last one at 760.degree. (upper crit. temp. 774-816.degree.) and heat-treated 1 hr at 649.degree. to give steel with 0.2% yield strength 50.41 kg/mm2, **tensile strength** 54.70 kg/mm2, and FATT50 -57.degree., compared to 44.15, 50.83, and -68.degree., resp., when the final rolling was at 838.degree..
IT **58428-01-6**, uses and miscellaneous
(hot-rolling of, for improved low-temp. strength and toughness)
RN 58428-01-6 HCA
CN Steel, Fe 97-99,Mn 0.9-1.4,Mo 0-0.4,Cr 0-0.2,Cu 0-0.2,C 0.1,Nb 0-0.1,Ni 0-0.1,V 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	97	-	99	7439-89-6
Mn	0.9	-	1.4	7439-96-5
Mo	0	-	0.4	7439-98-7
Cr	0	-	0.2	7440-47-3
Cu	0	-	0.2	7440-50-8
C		0.1		7440-44-0
Nb	0	-	0.1	7440-03-1
Ni	0	-	0.1	7440-02-0
V	0	-	0.1	7440-62-2

IC C22C
CC 55-11 (Ferrous Metals and Alloys)
IT **58428-01-6**, uses and miscellaneous 58428-02-7, uses and miscellaneous
(hot-rolling of, for improved low-temp. strength and toughness)

L142 ANSWER 17 OF 17 HCA COPYRIGHT 2003 ACS
77:167400 Use of 2Kh12VMBFR [chromium-tungsten-molybdenum-niobium-

vanadium-boron] steel for molds for the pressure die casting of brass. Permikin, Ya. A.; Terekhov, Yu. G. (Tul. Politekh. Inst., Tula, USSR). Metallovedenie i Termicheskaya Obrabotka Metallov (8), 35-7 (Russian) 1972. CODEN: MTOMAX. ISSN: 0026-0819.

AB The potential use of the steels 2Kh12VMBFR (C 0.17, Si 0.27, Mn 0.28, Cr 12.0, W 0.64, Mo 0.43, Nb 0.25, V 0.28, Ni, 0.41, Cu 0.09, P 0.021, and S 0.008%) and 1Kh17N2 (C 0.19, Si 0.13, Mn 0.56, Cr 17.1, Ni 2.3, Cu 0.15, P 0.016, and S 0.014%) for molds for pressure die casting of brass was studied. The steel 3Kh2V8F currently used in the production of these molds was also tested for comparison. The steels were quenched from 900-1150.degree. and the optimal **quenching temp**. detd. from the hardnesses. The Rockwell hardness, HRc, of 2Kh12VMBFR reaches 60 when quenching from 1100.degree.; lower HRc are obtained for 3Kh2V8F and 1Kh17N2. At >1130.degree., HRc decreases due to the appearance of excess . **delta**.-**ferrite**, hence 1100 and 1070.degree. can be considered to be optimal **quenching temps**. for 2Kh12VMBFR and 1Kh17N2, resp. The hardness required for the working surfaces of molds (HRc .apprx.40-5) can be obtained by tempering the 2 steels at 610 and 450.degree., resp. The mech. properties of tempered steels whose structure consists of sorbite and troostite were examd. Those of 3Kh2V8F are lower than those of the other 2 steels. The relatively high hardness of 2Kh12VMBFR combined with satisfactory plasticity makes this steel a promising material for molds. The heat resistance of the steels was evaluated from the max. temp. they could sustain for 1 hr without decreasing their hardness. The next crit. temps. were 650, 610, and 450.degree. for 3Kh2V8F, 2Kh12VMBFR, and 1Kh17N2 steels, resp. Expts. with 2Kh12VMBFR molds under industrial conditions show that this steel is suitable for large-size complex-shaped molds.

IT **37326-74-2**
(molds, for casting of brass)

RN 37326-74-2 HCA

CC 55-3 (Ferrous Metals and Alloys)

IT 37222-77-8 **37326-74-2**
(molds, for casting of brass)

=> d his l144-

FILE 'REGISTRY' ENTERED AT 16:30:32 ON 24 JAN 2003
L144 62 S L112 AND 1-100 NB/MAC
L145 32 S L112 AND 2-100 NB/MAC

FILE 'HCA' ENTERED AT 16:33:08 ON 24 JAN 2003
L146 26 S L145
L147 23 S L146 AND L114
L148 21 S L147 NOT (L131 OR L142)

=> d l148 1-21 cbib abs hitstr hitind

L148 ANSWER 1 OF 21 HCA COPYRIGHT 2003 ACS
137:373107 High-strength stainless **steel** having high resistance to corrosion and wear. Isozaki, Seiichi; Tomimura, Hironori; Hiramatsu, Naoto (Nisshin Steel Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2002332546 A2 20021122, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-138450 20010509.

AB The stainless **steel** contains C >0.03 and .ltoreq.0.15, Si 0.2-2.0, Ni 2.0-5.0, Cr 14.0-17.0, N >0.03 and .ltoreq.0.10, and B 0.0010-0.0070 wt.% and has .gtoreq.85 vol.% martensite phase and 0.05-1.0 wt.% total pptd. carbides. Optionally, the stainless **steel** contains .ltoreq.2.0 wt.% Ti, Nb, Zr, V, and/or W and .ltoreq.2.0 wt.% Mo and/or Cu. The **steel** does not need plating or heat treatment and is esp. suitable for wear-resistant applications.

IT **475111-65-0**
(high-strength stainless **steel** with high corrosion- and wear-resistance)

RN 475111-65-0 HCA

CN Iron alloy, base, Fe 62-84,Cr 14-17,Ni 2-5,Si 0.2-2,Cu 0-2,Mo 0-2,Nb 0-2,Ti 0-2,V 0-2,W 0-2,Zr 0-2,C 0-0.2,N 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	62	-	84	7439-89-6
Cr	14	-	17	7440-47-3
Ni	2	-	5	7440-02-0
Si	0.2	-	2	7440-21-3
Cu	0	-	2	7440-50-8
Mo	0	-	2	7439-98-7
Nb	0	-	2	7440-03-1
Ti	0	-	2	7440-32-6
V	0	-	2	7440-62-2
W	0	-	2	7440-33-7
Zr	0	-	2	7440-67-7
C	0	-	0.2	7440-44-0
N	0	-	0.1	17778-88-0

IC ICM C22C038-00
ICS C22C038-54

CC 55-3 (Ferrous Metals and Alloys)

ST stainless **steel** corrosion wear resistance

IT Abrasion-resistant materials
Corrosion-resistant materials
(high-strength stainless **steel** with high corrosion- and wear-resistance)

IT Carbides
(ppts.; high-strength stainless **steel** with high corrosion- and wear-resistance)

IT 475111-57-0 475111-58-1 475111-59-2 475111-60-5 475111-61-6
475111-62-7 475111-63-8 475111-64-9 **475111-65-0**
(high-strength stainless **steel** with high corrosion- and

wear-resistance)

L148 ANSWER 2 OF 21 HCA COPYRIGHT 2003 ACS
136:9403 Manufacture of silicon stainless **steel** parts for die casting machines. Iyama, Kazumasa; Takahashi, Shigeru; Maruyama, Kimitaka (Toshiba Machine Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001329348 A2 20011127, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-148428 20000519. PRIORITY: JP 2000-69140 20000313.

AB Injection sleeves, plunger chips, ladles, melt-storage tanks, nozzles, and dies for the die casting machines are made of high-Si stainless **steels** contg. C .ltoreq.0.1, Si 2-6, Mn .ltoreq.3, Ni 4-9, Cr 8-18, Mo .ltoreq.2, Cu 0.2-4, and Nb .ltoreq.2 wt.%. Cast stainless **steels** of the compns. are first pptn. hardened to increase in hardness of the parent materials, and then surficially nitrided to give the machine parts. Alternatively, the nitriding and the pptn. hardening are simultaneously carried out. Mech. processed stainless **steels** may be used in stead of cast ones. The machine parts show relatively low thermal cond. and high wear resistance at sliding part.

IT **375364-50-4**
(manuf. of die casting machine parts from high-silicon stainless **steel**)

RN 375364-50-4 HCA

CN Iron alloy, base, Fe 56-86,Cr 8-18,Ni 4-9,Si 2-6,Cu 0.2-4,Mn 0-3,Mo 0-2,Nb 0-2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	56	-	86	7439-89-6
Cr	8	-	18	7440-47-3
Ni	4	-	9	7440-02-0
Si	2	-	6	7440-21-3
Cu	0.2	-	4	7440-50-8
Mn	0	-	3	7439-96-5
Mo	0	-	2	7439-98-7
Nb	0	-	2	7440-03-1
C	0	-	0.1	7440-44-0

IC ICM C22C038-00
ICS C22C038-00; B22C009-06; B22D017-02; B22D017-20; B22D017-22; C21D001-06; C21D006-00; C21D006-02; C22C038-58

CC 55-6 (Ferrous Metals and Alloys)

ST die casting app silicon stainless **steel**; cast stainless **steel** die casting app; pptn hardening stainless **steel** part casting app; surface nitriding stainless **steel** part casting app; ladle die casting app stainless **steel**; tank die casting app stainless **steel**; nozzle die casting app stainless **steel**; plunger die casting app stainless **steel**; sleeve die casting app stainless **steel**

IT Casting of metals
(app. parts; manuf. of die casting machine parts from high-silicon stainless **steel**)
IT Dies
Ladles
Nozzles
Tanks (containers)
(for die casting app.; manuf. of die casting machine parts from high-silicon stainless **steel**)
IT Precipitation hardening
(manuf. of die casting machine parts from high-silicon stainless **steel**)
IT Cast alloys
(stainless **steel**; manuf. of die casting machine parts from high-silicon stainless **steel**)
IT Nitriding
(surface; manuf. of die casting machine parts from high-silicon stainless **steel**)
IT 375364-49-1 **375364-50-4**
(manuf. of die casting machine parts from high-silicon stainless **steel**)

L148 ANSWER 3 OF 21 HCA COPYRIGHT 2003 ACS
135:375043 Die casting and machine therefor having improved ejection sleeve. Takahashi, Shigeru; Kato, Shinichi; Kairiku, Yoshinori; Miyata, Mitsuhiro (Toshiba Machine Co., Ltd., Japan; Toshiba Corp.; Toshiba Chemical Corp.). Jpn. Kokai Tokkyo Koho JP 2001321911 A2 20011120, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-143477 20000516.
AB In a die casting machine, an ejection sleeve is made of a Si-high stainless **steel** having a comparatively low thermal cond. The **steel** preferably contains C .ltoreq.0.1, Si 2-6, Mn .ltoreq.3, Ni 4-9, Cr 8-18, Mo .ltoreq.2, Cu 0.2-4, and Nb + Al 0.1-2%. The sleeve is subjected to age hardening and nitridation. The ejection sleeve is heated with a heating means such as a gas burner, and during casting, the temp. of the inner peripheral surface of the ejection sleeve immediately prior to melt supply is maintained at 150-500.degree.. Rapid cooling of the melt inside the ejection sleeve in the die casting machine is prevented and the no. of casting defects in the die-cast products is decreased.
IT **374730-23-1**
(high-silicon; die casting and machine therefor having improved ejection sleeve from)
RN 374730-23-1 HCA
CN Iron alloy, base, Fe 56-86,Cr 8-18,Ni 4-9,Si 2-6,Cu 0.2-4,Mn 0-3,Al 0-2,Mo 0-2,Nb 0-2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	56	-	86	7439-89-6
Cr	8	-	18	7440-47-3

Ni	4	-	9	7440-02-0
Si	2	-	6	7440-21-3
Cu	0.2	-	4	7440-50-8
Mn	0	-	3	7439-96-5
Al	0	-	2	7429-90-5
Mo	0	-	2	7439-98-7
Nb	0	-	2	7440-03-1
C	0	-	0.1	7440-44-0

IC ICM B22D017-20
ICS B22D017-20; C22C038-00; C22C038-58
CC 56-2 (Nonferrous Metals and Alloys)
ST die casting ejection sleeve silicon **steel** age hardening nitridation
IT 12597-68-1, Stainless **steel**, processes 374730-22-0 **374730-23-1**
(high-silicon; die casting and machine therefor having improved ejection sleeve from)

L148 ANSWER 4 OF 21 HCA COPYRIGHT 2003 ACS
135:49227 High-silicon stainless **steel** barrel for extrusion apparatus for plastics. Tashiro, Takaharu; Miyauchi, Mikiyoshi; Shimada, Saneyuki (Toshiba Machine Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001172747 A2 20010626, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-355896 19991215.
AB A barrel for extrusion app. for plastics is from stainless **steel** contg. C .ltoreq.0.1, Si 2-6, Mn .ltoreq.3, Ni 4-9, Cr 8-18, Mo .ltoreq.2, Cu 0.2-4, Nb+Al 0.1-2%. The barrel can be nitrided on the inner surface. Sliding characteristic of the barrel is improved and service life of the screw is extended.
IT **344906-08-7**
(high-silicon stainless **steel** barrel for extrusion app. for plastics)
RN 344906-08-7 HCA
CN Iron alloy, base, Fe 54-86,Cr 8-18,Ni 4-9,Si 2-6,Cu 0.2-4,Mn 0-3,Al 0.1-2,Nb 0.1-2,Mo 0-2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	54	-	86	7439-89-6
Cr	8	-	18	7440-47-3
Ni	4	-	9	7440-02-0
Si	2	-	6	7440-21-3
Cu	0.2	-	4	7440-50-8
Mn	0	-	3	7439-96-5
Al	0.1	-	2	7429-90-5
Nb	0.1	-	2	7440-03-1
Mo	0	-	2	7439-98-7
C	0	-	0.1	7440-44-0

IC ICM C22C038-00

ICS B29C047-66; C22C038-58
CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 38
ST silicon stainless **steel** barrel extrusion app plastic nitridation
IT Nitriding
(gas, of inner surface of; high-silicon stainless **steel** barrel for extrusion app. for plastics)
IT Extrusion apparatus for plastics and rubbers
(high-silicon stainless **steel** barrel for extrusion app. for plastics)
IT Nitriding
(of inner surface of; high-silicon stainless **steel** barrel for extrusion app. for plastics)
IT 344906-07-6 **344906-08-7**
(high-silicon stainless **steel** barrel for extrusion app. for plastics)

L148 ANSWER 5 OF 21 HCA COPYRIGHT 2003 ACS
135:8318 Stainless **steel** alloyed for cellulose-pulp milling plate for papermaking fibers. Dodd, John (J & L Fiber Services, Inc., USA). U.S. US 6245289 B1 20010612, 11 pp., Cont.-in-part of U.S. 5,824,265. (English). CODEN: USXXAM. APPLICATION: US 1998-175241 19981020. PRIORITY: US 1996-637114 19960424.
AB The cast stainless **steel** for manuf. of wear-resistant grooved disks contains C 0.2-0.6, Mn 0.5-1.5, Si 0.5-1.5, Cr 14-18, Ni 2-5, Cu 2-4, Mo .ltoreq.1, Nb 1.5-5.0, V .ltoreq.1.5, P .ltoreq.0.05, S .ltoreq.0.05, and Mg and/or rare-earth metals at .ltoreq.0.5% total. The preferred stainless **steel** contains C 0.3-0.4, Mn 0.4-0.6, Si 0.6-0.8, Cr 15.5-17.5, Ni 3.5-4.5, Cu 2.5-3.5, Mo 0.5, Nb 2.8-3.2, V 0.5-1, P 0.02, S 0.02, and Mg and/or rare-earth metals at 0.15-0.2% total. The Nb and V form dispersed carbides pptd. at high temps. during the melt solidification in casting. The rare earth metals and/or Mg increase the toughness of cast disk by controlling the shape of dispersed carbides, resulting in higher wear resistance compared with that of the 17-4PH maraging **steel**. The removal of C to dispersed carbides increases the amt. of Cr present in solid soln. for corrosion resistance.
IT **342005-24-7**
(alloying of; stainless **steel** alloyed for cellulose-pulp cast milling plate for papermaking fibers)
RN 342005-24-7 HCA
CN Iron alloy, base, Fe 61-79,Cr 14-18,Ni 2-5,Nb 1.5-5,Cu 2-4,Mn 0.5-1.5,Si 0.5-1.5,V 0-1.5,Mo 0-1,C 0.2-0.6,Mg 0-0.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	61 - 79	7439-89-6
Cr	14 - 18	7440-47-3

Ni	2	-	5	7440-02-0
Nb	1.5	-	5	7440-03-1
Cu	2	-	4	7440-50-8
Mn	0.5	-	1.5	7439-96-5
Si	0.5	-	1.5	7440-21-3
V	0	-	1.5	7440-62-2
Mo	0	-	1	7439-98-7
C	0.2	-	0.6	7440-44-0
Mg	0	-	0.5	7439-95-4

IC ICM C22C038-42
ICS C22C038-48; C21D009-00
NCL 420060000
CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 43
ST papermaking fiber milling stainless **steel** plate; stainless **steel** alloying aq cellulose pulp milling
IT Fibers
(cellulosic, milling of, in aq. pulp; stainless **steel** alloyed for cellulose-pulp cast milling disk for papermaking fibers)
IT Paper
(manuf. of; stainless **steel** alloyed for cellulose-pulp cast milling plate for papermaking fibers)
IT Rare earth metals, uses
(microalloying with; stainless **steel** alloyed for cellulose-pulp cast milling disk for papermaking fibers)
IT Cast alloys
(stainless **steel**, in papermaking; stainless **steel** alloyed for cellulose-pulp cast milling plate for papermaking fibers)
IT **342005-24-7** 342005-25-8 342005-26-9
(alloying of; stainless **steel** alloyed for cellulose-pulp cast milling plate for papermaking fibers)
IT 7439-95-4, Magnesium, uses
(microalloying with; stainless **steel** alloyed for cellulose-pulp cast milling plate for papermaking fibers)

L148 ANSWER 6 OF 21 HCA COPYRIGHT 2003 ACS
134:283938 Austenitic **steel** weld joint with high resistance to weld cracking and sulfate corrosion and welding alloy for it. Hirata, Hiromasa; Sagara, Masayuki (Sumitomo Metal Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001107196 A2 20010417, 10 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-286236 19991007.
AB The weld joint has a welded part having a compn. contg. C .ltoreq.0.08, Mn .ltoreq.3, P .ltoreq.0.02, Ni 4-75, Cr 15-30, Al .ltoreq.0.5, N .ltoreq.0.1, O .ltoreq.0.1, Nb, Ta, Ti, and/or Zr 0.1-5 in total, Mo and/or W 0-20 in total, Co 0-5, V 0-0.25, B 0-0.01, Ca 0-0.01, Mg 0-0.01, REM 0-0.01, Si .ltoreq.[0.15(Nb + Ta + Ti + Zr) + 0.25], Cu 0-8 and .ltoreq.[1.5(Nb + Ta + Ti + Zr) + 4.0], and S .ltoreq.[0.0015(Nb + Ta + Ti + Zr) + 0.003] wt.%, where (Ni + Co + 2Cu) is .gtoreq.25 wt.%. The welding alloy is a Fe alloy

contg. C .ltoreq.0.08, Si .ltoreq.2, Mn .ltoreq.3, P .ltoreq.0.02, S .ltoreq.0.02, Ni 4-75, Cr 15-30, Al .ltoreq.0.5, N .ltoreq.0.1, O .ltoreq.0.1, Nb, Ta, Ti, and/or Zr 0.1-5 in total, Mo and/or W 0-20 in total, Co 0-5, Cu 0-8, V 0-0.25, B 0-0.01, Ca 0-0.01, Mg 0-0.01, and REM 0-0.01 wt.%, where (Ni + Co + 2Cu) is .gtoreq.25 wt.%. The weld joint is useful for high-temp. device such as boilers.

IT **333721-04-3**
(welding alloy; welding alloy for formation of austenitic **steel** weld joint with high resistance to weld cracking and sulfate corrosion)

RN 333721-04-3 HCA

CN Iron alloy, base, Fe 0-81,Ni 4-75,Cr 15-30,Mo 0-20,W 0-20,Cu 0-8,Co 0-5,Nb 0-5,Ta 0-5,Ti 0-5,Zr 0-5,Mn 0-3,Si 0-2,Al 0-0.5,V 0-0.2,C 0-0.1,N 0-0.1,O 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	0	-	81	7439-89-6
Ni	4	-	75	7440-02-0
Cr	15	-	30	7440-47-3
Mo	0	-	20	7439-98-7
W	0	-	20	7440-33-7
Cu	0	-	8	7440-50-8
Co	0	-	5	7440-48-4
Nb	0	-	5	7440-03-1
Ta	0	-	5	7440-25-7
Ti	0	-	5	7440-32-6
Zr	0	-	5	7440-67-7
Mn	0	-	3	7439-96-5
Si	0	-	2	7440-21-3
Al	0	-	0.5	7429-90-5
V	0	-	0.2	7440-62-2
C	0	-	0.1	7440-44-0
N	0	-	0.1	17778-88-0
O	0	-	0.1	17778-80-2

IC ICM C22C038-00
ICS B23K035-30; C22C038-54; C22C038-58

CC 55-9 (Ferrous Metals and Alloys)

ST austenitic **steel** weld joint cracking sulfate corrosion resistance; welding alloy **steel** weld joint cracking sulfate corrosion resistance

IT Rare earth metals, uses
(microalloying element; welding alloy for formation of austenitic **steel** weld joint with high resistance to weld cracking and sulfate corrosion)

IT Welding of metals
(welding alloy for formation of austenitic **steel** weld joint with high resistance to weld cracking and sulfate corrosion)

IT 333720-96-0

(base **steel** sheet; welding alloy for formation of austenitic **steel** weld joint with high resistance to weld cracking and sulfate corrosion)

IT 7439-95-4, Magnesium, uses 7440-42-8, Boron, uses 7440-70-2, Calcium, uses
(microalloying element; welding alloy for formation of austenitic **steel** weld joint with high resistance to weld cracking and sulfate corrosion)

IT 333720-90-4 333720-91-5 333720-92-6 333720-93-7 333720-94-8 333720-95-9 333721-03-2
(welded joint; welding alloy for formation of austenitic **steel** weld joint with high resistance to weld cracking and sulfate corrosion)

IT 333720-97-1 333720-98-2 333720-99-3 333721-00-9 333721-01-0 333721-02-1 **333721-04-3**
(welding alloy; welding alloy for formation of austenitic **steel** weld joint with high resistance to weld cracking and sulfate corrosion)

L148 ANSWER 7 OF 21 HCA COPYRIGHT 2003 ACS

134:283914 Precipitation hardening stainless **steels** and manufacture of their corrosion-resistant articles. Shimizu, Takayasu; Shimizu, Yoshiyuki; Hosoishi, Mikio (Nippon Silicolloy Kogyo K. K., Japan). Jpn. Kokai Tokkyo Koho JP 2001107194 A2 20010417, 17 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-277360 19990929.

AB The **steels** comprise of C .ltoreq.0.08, Si 2.0-5.0, Mn 0.05-3.0, Ni 4.0-10.0, Cr .gtoreq.6.0 and <12.0, Mo 0.2-5.0, Cu >3.0 and .ltoreq.6.0, Nb .ltoreq.5.0, Ta .ltoreq.8.0 wt.%, and balance Fe and the Cr equiv. (x) and the Ni equiv. (y) in the solid. soln. state, defined by equations Cr equiv. = Cr + 0.3Mo + 1.5Si + 0.5Nb and Ni equiv. = Ni + 30C + 0.5Mn + 0.1Co, are within points defined by lines a, b, c, and d in a diagram. The lines are given by the following equations, a: y = 25.40 - 0.80x, b: y = 19.20 - 0.81x, c: y = -8.48 + 1.03x, and d: y = -5.00 + 0.50x. The **steel** compns. may contain 0.1-2.0 wt.% Ti or 0.5-20.0 wt.% Co when the Cu content is limited to 0.5-6.0% or may contain 0.1-2.0 wt.% Ti and 0.5-20.0 wt.% Co when the Cu content is .ltoreq.6.0 wt.%. Articles made of the above claimed **steels** are soln. treated by cooling after heating to 950-1150.degree. and then aged by heating to 200-700.degree. to give corrosion-resistant articles.

IT **332422-06-7 332422-07-8 332422-08-9**
(manuf. of corrosion-resistant articles by controlled soln. treatment and aging of pptn. hardening stainless **steels** having certain compn. ratios)

RN 332422-06-7 HCA

CN Iron alloy, base, Fe 44-87,Cr 6-12,Ni 4-10,Ta 0-8,Cu 0.5-6,Si 2-5,Mo 0.2-5,Nb 0-5,Mn 0-3,Ti 0.1-2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number

Fe	44	-	87	7439-89-6
Cr	6	-	12	7440-47-3
Ni	4	-	10	7440-02-0
Ta	0	-	8	7440-25-7
Cu	0.5	-	6	7440-50-8
Si	2	-	5	7440-21-3
Mo	0.2	-	5	7439-98-7
Nb	0	-	5	7440-03-1
Mn	0	-	3	7439-96-5
Ti	0.1	-	2	7440-32-6
C	0	-	0.1	7440-44-0

RN 332422-07-8 HCA
CN Iron alloy, base, Fe 26-87,Co 0.5-20,Cr 6-12,Ni 4-10,Ta 0-8,Cu 0.5-6,Si 2-5,Mo 0.2-5,Nb 0-5,Mn 0-3,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	26	-	87	7439-89-6
Co	0.5	-	20	7440-48-4
Cr	6	-	12	7440-47-3
Ni	4	-	10	7440-02-0
Ta	0	-	8	7440-25-7
Cu	0.5	-	6	7440-50-8
Si	2	-	5	7440-21-3
Mo	0.2	-	5	7439-98-7
Nb	0	-	5	7440-03-1
Mn	0	-	3	7439-96-5
C	0	-	0.1	7440-44-0

RN 332422-08-9 HCA
CN Iron alloy, base, Fe 24-87,Co 0.5-20,Cr 6-12,Ni 4-10,Ta 0-8,Cu 0-6,Si 2-5,Mo 0.2-5,Nb 0-5,Mn 0-3,Ti 0.1-2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	24	-	87	7439-89-6
Co	0.5	-	20	7440-48-4
Cr	6	-	12	7440-47-3
Ni	4	-	10	7440-02-0
Ta	0	-	8	7440-25-7
Cu	0	-	6	7440-50-8
Si	2	-	5	7440-21-3
Mo	0.2	-	5	7439-98-7
Nb	0	-	5	7440-03-1
Mn	0	-	3	7439-96-5
Ti	0.1	-	2	7440-32-6
C	0	-	0.1	7440-44-0

IC ICM C22C038-00
ICS C21D006-00; C22C038-58
CC 55-3 (Ferrous Metals and Alloys)
ST pptn hardening corrosion resistant stainless **steel**; aging corrosion resistant stainless **steel**; soln treatment corrosion resistant stainless **steel**
IT Aging, materials
Corrosion-resistant materials
Precipitation hardening
(manuf. of corrosion-resistant articles by controlled soln. treatment and aging of pptn. hardening stainless **steels** having certain compn. ratios)
IT Heat treatment
(soln.; manuf. of corrosion-resistant articles by controlled soln. treatment and aging of pptn. hardening stainless **steels** having certain compn. ratios)
IT 332421-71-3 332421-72-4 332421-73-5 332421-74-6 332421-75-7
332421-76-8 332421-77-9 332421-78-0 332421-79-1 332421-80-4
332421-81-5 332421-82-6 332421-83-7 332421-84-8 332421-85-9
332421-86-0 332421-87-1 332421-88-2 332421-89-3 332421-90-6
332421-91-7 332421-92-8 332421-93-9 332421-94-0 332421-95-1
332421-96-2 332421-99-5 332422-01-2 332422-03-4
332422-06-7 332422-07-8 332422-08-9
(manuf. of corrosion-resistant articles by controlled soln. treatment and aging of pptn. hardening stainless **steels** having certain compn. ratios)

L148 ANSWER 8 OF 21 HCA COPYRIGHT 2003 ACS
133:311819 Stainless **steel** product for producing bipolar plate for polymer electrode fuel cell. Tarutani, Yoshio; Doi, Takashi; Seki, Akira; Fukuta, Shinji (Sumitomo Metal Industries, Ltd., Japan). Eur. Pat. Appl. EP 1046723 A1 20001025, 48 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2000-401066 20000417. PRIORITY: JP 1999-111446 19990419; JP 1999-115461 19990422; JP 1999-133218 19990513; JP 1999-144065 19990524; JP 1999-208278 19990722.
AB The stainless **steel** product has passive film on the surface, and at least one of a conductive metallic inclusion of carbide and a conductive metallic inclusion of boride protrudes through an outer surface of passive film from stainless **steel** under the passive film. The stainless **steel** product has low contact elec. resistance and suitable for use in bipolar plates of a polymer electrode fuel cell.
IT **302557-50-2 302557-51-3**
(stainless **steel** product for producing bipolar plate for polymer electrode fuel cell)
RN 302557-50-2 HCA
CN Iron alloy, base, Fe 0-90,Cr 10-36,Nb 0-25,Ti 0-25,Mo 0-7,Al 0-6,Ni 0-5,W 0-4,B 0-3.5,Mn 0-1.5,Si 0-1.5,Cu 0-1,V 0-0.3,C 0-0.2,misch metal 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	0 - 90	7439-89-6
Cr	10 - 36	7440-47-3
Nb	0 - 25	7440-03-1
Ti	0 - 25	7440-32-6
Mo	0 - 7	7439-98-7
Al	0 - 6	7429-90-5
Ni	0 - 5	7440-02-0
W	0 - 4	7440-33-7
B	0 - 3.5	7440-42-8
Mn	0 - 1.5	7439-96-5
Si	0 - 1.5	7440-21-3
Cu	0 - 1	7440-50-8
V	0 - 0.3	7440-62-2
C	0 - 0.2	7440-44-0
Misch metal	0 - 0.1	8049-20-5

RN 302557-51-3 HCA
CN Iron alloy, base, Fe 0-85,Cr 15-36,Nb 0-25,Ti 0-25,Mo 0-7,Al 0-6,Ni 0-5,B 0-3.5,Mn 0-1.5,Si 0-1.5,Cu 0-1,C 0-0.2 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	0 - 85	7439-89-6
Cr	15 - 36	7440-47-3
Nb	0 - 25	7440-03-1
Ti	0 - 25	7440-32-6
Mo	0 - 7	7439-98-7
Al	0 - 6	7429-90-5
Ni	0 - 5	7440-02-0
B	0 - 3.5	7440-42-8
Mn	0 - 1.5	7439-96-5
Si	0 - 1.5	7440-21-3
Cu	0 - 1	7440-50-8
C	0 - 0.2	7440-44-0

IC ICM C22C038-18
ICS H01M008-02; C22C038-22; C22C038-44; C22C038-40; H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 55
ST fuel cell electrode stainless **steel** product
IT Contact resistance
Fuel cell separators
Fuel cells
Pickling
(stainless **steel** product for producing bipolar plate for polymer electrode fuel cell)
IT 12069-32-8, Boron carbide (B4C) 12069-89-5, Molybdenum carbide (Mo2C) 12070-12-1, Tungsten carbide wc

(shot blasting with; stainless **steel** product for producing bipolar plate for polymer electrode fuel cell)

IT 12597-68-1, Stainless **steel**, uses **302557-50-2**
302557-51-3 302557-52-4 302557-53-5 302557-54-6
302557-55-7 302557-56-8 302557-57-9 302557-58-0 302557-60-4
302557-62-6 302557-64-8 302557-66-0 302557-68-2 302557-70-6
302557-72-8 302557-74-0 302557-76-2 302557-78-4 302557-79-5
302557-81-9 302557-83-1 302557-85-3 302557-87-5 302557-89-7
302557-91-1 302557-93-3 302557-96-6 302557-98-8 302557-99-9
302558-01-6 302558-04-9 302558-05-0 302558-07-2 302558-08-3
302558-10-7 302558-12-9 302558-14-1 302558-16-3 302558-18-5
302558-21-0 302558-23-2 302558-26-5 302558-27-6 302558-29-8
302558-31-2 302558-34-5 302558-36-7 302558-38-9 302558-40-3
302558-42-5 302558-44-7 302558-46-9 302558-47-0 302558-49-2
302558-50-5 302558-51-6 302558-52-7 302558-53-8 302558-54-9
302558-55-0 302558-56-1 302558-57-2 302558-58-3 302558-59-4
302558-60-7 302558-61-8 302558-62-9 302558-63-0 302558-64-1
302558-65-2
(stainless **steel** product for producing bipolar plate for polymer electrode fuel cell)

IT 12006-80-3, Chromium boride Cr2B 12105-81-6, Chromium carbide (Cr23C6)
(stainless **steel** product for producing bipolar plate for polymer electrode fuel cell)

IT 7664-39-3, Hydrofluoric acid, uses 7697-37-2, Nitric acid, uses
(stainless **steel** product for producing bipolar plate for polymer electrode fuel cell)

L148 ANSWER 9 OF 21 HCA COPYRIGHT 2003 ACS
132:282270 Stainless **steel** for cast rotary disks in mechanical treatment of papermaking pulp. Dodd, John (J&l Fiber Services, Inc., USA). Eur. Pat. Appl. EP 995810 A1 20000426, 13 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 1999-402513 19991014. PRIORITY: US 1998-175241 19981020.

AB The rotary refiner disk or segment in papermaking is cast from stainless **steel** contg. C 0.2-0.6, Mn 0.5-1.5, Si 0.5-1.5, Cr 14-18, Ni 2-5, Cu 2-4, Mo .ltoreq.1, Nb 1.5-5.0, V .ltoreq.1.5, P .ltoreq.0.05, S .ltoreq.0.05, and rare-earth metals and/or Mg at .ltoreq.0.5%. The cast microstructure contains discrete carbides of Nb and V formed at high temps. during the melting process. The rare-earth metals and/or Mg increase the toughness of cast disks by shaping the carbides as controlled dispersed particles. The cast stainless **steel** provides increased toughness and corrosion resistance, as well as increased wear resistance assocd. with the carbide formation. The cast disks are preferably heated for 3-5 h at 1600-1800.degree. F, cooled by blown air to room temp., and reheated for 3-5 h at 900-1050.degree. F for age hardening. The typical stainless **steel** contains C 0.3-0.4, Mn 0.4-0.6, Si 0.5-1.5, Cr 15.5-1.75, Ni 3.5-4.5, Cu 2.5-3.5, Mo 0.5, Nb 2.8-3.2, V 0.5-1.0, P 0.02, S 0.02, and rare-earth metals and/or Mg 0.15-0.20%.

Com. 17-4PH martensitic **steel** having the similar compn. with low C of 0.07, Nb 0.30, and Mo 0.10% shows low hardness as well as low resistance to abrasive wear at comparable corrosion resistance.

IT **264145-80-4**
(alloying of; cast stainless **steel** for rotary refining disks in treatment of aq. papermaking pulp)

RN 264145-80-4 HCA

CN Iron alloy, base, Fe 61-79,Cr 14-18,Ni 2-5,Nb 1.5-5,Cu 2-4,Mn 0.5-1.5,Si 0.5-1.5,V 0-1.5,Mo 0-1,C 0.2-0.6,Mg 0-0.5,misch metal 0-0.5 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	61	-	79	7439-89-6
Cr	14	-	18	7440-47-3
Ni	2	-	5	7440-02-0
Nb	1.5	-	5	7440-03-1
Cu	2	-	4	7440-50-8
Mn	0.5	-	1.5	7439-96-5
Si	0.5	-	1.5	7440-21-3
V	0	-	1.5	7440-62-2
Mo	0	-	1	7439-98-7
C	0.2	-	0.6	7440-44-0
Mg	0	-	0.5	7439-95-4
Misch metal	0	-	0.5	8049-20-5

IC ICM C22C038-42
ICS C22C038-48; C22C038-20; C22C038-26

CC 55-3 (Ferrous Metals and Alloys)
Section cross-reference(s): 43

ST cast stainless **steel** rotary disk papermaking; stainless **steel** alloying niobium carbide pptn

IT Abrasion-resistant materials
(cast; stainless **steel** for cast rotary refining disks resistant to aq. papermaking pulp)

IT Paper
(manuf., pulp refining in; cast stainless **steel** for rotary refining disks in treatment of aq. papermaking pulp)

IT Cast alloys
(stainless **steel**; cast stainless **steel** for rotary refining disks in treatment of aq. papermaking pulp)

IT **264145-80-4** 264145-81-5
(alloying of; cast stainless **steel** for rotary refining disks in treatment of aq. papermaking pulp)

IT 264145-82-6 264145-83-7
(cast; stainless **steel** for cast rotary refining disks in treatment of aq. papermaking pulp)

L148 ANSWER 10 OF 21 HCA COPYRIGHT 2003 ACS
132:81478 Manufacture of hot rolled stainless **steel** sheets

without surface cracks. Sugimura, Kimimasa; Fujiyama, Tamaki; Hirai, Masasumi (Pacific Metals Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2000005803 A2 20000111, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-190969 19980623.

AB Continuously cast stainless **steel** slabs are hot rolled without pretreatment to give the sheets contg. C .ltoreq.0.2, Si 0.1-2, Mn 0.3-3, P .ltoreq.0.04, Cr 15-30, Ni 3-30, N 0.01-0.4, S .ltoreq.0.005, O .ltoreq.0.007, Al .ltoreq.0.02, and optionally Mo .ltoreq.4, Cu .ltoreq.3, Nb .ltoreq.2, Ti .ltoreq.2 wt.%, and balance Fe and having .delta. .gtoreq.7%, where .delta. is calcd. from the following equations: Creq = (Cr%) + 1.5(Si%) + (Mo%) + 0.5(Nb%), Nieq = (Ni%) + 30(C% + N%) + 0.5(Mn%), and .delta.(%) = -0.0816(Creq)2 + 5.975(Creq)-3.786(Nieq) + 0.0587(Creq).cntdot.(Nieq)-46.23. Optionally, the cast slabs may be breakdown-rolled at draft 30-65% before the hot rolling. Hot rolled sheets can be manufd. in high yields at low costs.

IT **254115-66-7**
(hot rolling of continuously cast stainless **steel** slabs for sheets without surface cracks)

RN 254115-66-7 HCA

CN Iron alloy, base, Fe 23-81,Cr 15-30,Ni 3-30,Mo 0-4,Mn 0.3-3,Cu 0-3,Si 1-2,Nb 0-2,Ti 0-2,N 0-0.4,C 0-0.2 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	23	-	81	7439-89-6
Cr	15	-	30	7440-47-3
Ni	3	-	30	7440-02-0
Mo	0	-	4	7439-98-7
Mn	0.3	-	3	7439-96-5
Cu	0	-	3	7440-50-8
Si	1	-	2	7440-21-3
Nb	0	-	2	7440-03-1
Ti	0	-	2	7440-32-6
N	0	-	0.4	17778-88-0
C	0	-	0.2	7440-44-0

IC ICM B21B003-02
ICS B21B001-26; B21B045-00; C22C038-00; C22C038-58

CC 55-11 (Ferrous Metals and Alloys)

ST hot rolling stainless **steel** cracking prevention

IT Rolling (metals)
(hot; hot rolling of continuously cast stainless **steel** slabs for sheets without surface cracks)

IT 117117-83-6 222550-26-7 254115-61-2 254115-62-3 254115-63-4 254115-64-5 254115-65-6 **254115-66-7**
(hot rolling of continuously cast stainless **steel** slabs for sheets without surface cracks)

L148 ANSWER 11 OF 21 HCA COPYRIGHT 2003 ACS

131:312881 Precipitation hardened silicon **steel** for machine

parts. Shimizu, Takayasu; Shimizu, Yoshiyuki (Nippon Silicolloy Kogyo K. K., Japan). Jpn. Kokai Tokkyo Koho JP 11293410 A2 19991026 Heisei, 22 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-94456 19980407.

AB The **steel** contains C .ltoreq.0.10, Si 2.0-9.0, Mn 0.05-6.0, Ni 1-24, Cr 6-28, Mo 0.2-4.0, Nb 0.03-2.0, Cu .LAMBDA.<4.0, W .ltoreq.4.0, Co .ltoreq.3.0, Al .ltoreq.1.0, TI .ltoreq.2.0, V .ltoreq.4.0, B .ltoreq.3.0, Ce .ltoreq.0.4, and La .ltoreq.0.4%. The parts of the **steel** which require hard hardness are heat treated by the process including operations 1-2-3 described below. The parts of the **steel** which do not require hard hardness are heat treated by the process including operations 1-3 or 1-2. (1) Heating to 900-1100.degree., rapid cooling, and aging at 600-700.degree.. (2) Heating to 950-1150.degree. and rapid cooling. (3) Aging at 400-600.degree.. The pptn. hardened **steel** has good mech. properties and is suitable for various machine parts.

IT **247938-12-1 247938-14-3 247938-16-5 247938-24-5**
(pptn. hardened silicon **steel** manufd. by controlled heat treatment for machine parts)

RN 247938-12-1 HCA

CN Iron alloy, base, Fe 20-91,Cr 6-25,Ni 1-12,Si 2-9,Mn 0-6,Mo 0.2-4,Cu 0-4,V 0-4,W 0-4,B 0-3,Co 0-3,Nb 0-2,Ti 0-2,Al 0-1,misch metal 0-0.4,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	20	-	91	7439-89-6
Cr	6	-	25	7440-47-3
Ni	1	-	12	7440-02-0
Si	2	-	9	7440-21-3
Mn	0	-	6	7439-96-5
Mo	0.2	-	4	7439-98-7
Cu	0	-	4	7440-50-8
V	0	-	4	7440-62-2
W	0	-	4	7440-33-7
B	0	-	3	7440-42-8
Co	0	-	3	7440-48-4
Nb	0	-	2	7440-03-1
Ti	0	-	2	7440-32-6
Al	0	-	1	7429-90-5
Misch metal	0	-	0.4	8049-20-5
C	0	-	0.1	7440-44-0

RN 247938-14-3 HCA

CN Iron alloy, base, Fe 16-89,Cr 6-25,Ni 3-16,Si 2-9,Mn 0-6,Mo 0.2-4,Cu 0-4,V 0-4,W 0-4,B 0-3,Co 0-3,Nb 0-2,Ti 0-2,Al 0-1,misch metal 0-0.4,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component	Component

	Percent			Registry Number
Fe	16	-	89	7439-89-6
Cr	6	-	25	7440-47-3
Ni	3	-	16	7440-02-0
Si	2	-	9	7440-21-3
Mn	0	-	6	7439-96-5
Mo	0.2	-	4	7439-98-7
Cu	0	-	4	7440-50-8
V	0	-	4	7440-62-2
W	0	-	4	7440-33-7
B	0	-	3	7440-42-8
Co	0	-	3	7440-48-4
Nb	0	-	2	7440-03-1
Ti	0	-	2	7440-32-6
Al	0	-	1	7429-90-5
Misch metal	0	-	0.4	8049-20-5
C	0	-	0.1	7440-44-0

RN 247938-16-5 HCA
CN Iron alloy, base, Fe 5.5-84,Cr 10-28,Ni 4-24,Si 2-9,Mn 0-6,Mo 0.2-4,Cu 0-4,V 0-4,W 0-4,B 0-3,Co 0-3,Nb 0-2,Ti 0-2,Al 0-1,misch metal 0-0.4,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	5.5	-	84	7439-89-6
Cr	10	-	28	7440-47-3
Ni	4	-	24	7440-02-0
Si	2	-	9	7440-21-3
Mn	0	-	6	7439-96-5
Mo	0.2	-	4	7439-98-7
Cu	0	-	4	7440-50-8
V	0	-	4	7440-62-2
W	0	-	4	7440-33-7
B	0	-	3	7440-42-8
Co	0	-	3	7440-48-4
Nb	0	-	2	7440-03-1
Ti	0	-	2	7440-32-6
Al	0	-	1	7429-90-5
Misch metal	0	-	0.4	8049-20-5
C	0	-	0.1	7440-44-0

RN 247938-24-5 HCA
CN Iron alloy, base, Fe 5.1-91,Cr 6-28,Ni 1-24,Si 2-9,Mn 0-6,Mo 0.2-4,Cu 0-4,V 0-4,W 0-4,B 0-3,Co 0-3,Nb 0-2,Ti 0-2,Al 0-1,Ce 0-0.4,La 0-0.4,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number

Fe	5.1	-	91	7439-89-6
Cr	6	-	28	7440-47-3
Ni	1	-	24	7440-02-0
Si	2	-	9	7440-21-3
Mn	0	-	6	7439-96-5
Mo	0.2	-	4	7439-98-7
Cu	0	-	4	7440-50-8
V	0	-	4	7440-62-2
W	0	-	4	7440-33-7
B	0	-	3	7440-42-8
Co	0	-	3	7440-48-4
Nb	0	-	2	7440-03-1
Ti	0	-	2	7440-32-6
Al	0	-	1	7429-90-5
Ce	0	-	0.4	7440-45-1
La	0	-	0.4	7439-91-0
C	0	-	0.1	7440-44-0

IC ICM C22C038-00
ICS C21D001-10; C21D001-42; C21D009-00; C22C038-58; C21D009-28; C21D009-38
CC 55-3 (Ferrous Metals and Alloys)
ST machine part silicon **steel** pptn hardening heat treatment
IT Heat treatment
Machinery parts
Precipitation hardening
(pptn. hardened silicon **steel** manufd. by controlled heat treatment for machine parts)
IT **247938-12-1** 247938-13-2 **247938-14-3**
247938-15-4 **247938-16-5** 247938-17-6 247938-18-7
247938-19-8 247938-20-1 247938-21-2 247938-22-3 247938-23-4
247938-24-5
(pptn. hardened silicon **steel** manufd. by controlled heat treatment for machine parts)

L148 ANSWER 12 OF 21 HCA COPYRIGHT 2003 ACS
131:172248 Enameled **steel** apparatus for concentration and purification of sulfuric acid. Lailach, Gunter; Renner, Michael; Savakis, Stylianos (Bayer A.-G., Germany). Eur. Pat. Appl. EP 937680 A1 19990825, 9 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (German). CODEN: EPXXDW. APPLICATION: EP 1999-102513 19990210. PRIORITY: DE 1998-19807632 19980223.
AB Sulfuric acid is concd. to 95-98% with oxidative purifn. using a distn. system contg. glass, silicon-iron or ceramic packing, fed with hot liq. (270-340.degree.C) sulfuric acid, where the system contains a free-circulating evaporator at the base. The evaporator is a tube-bundle heat exchanger. The system is manufd. from an enameled Si-contg. austenitic-ferritic **steel**.
IT **239101-10-1**
(enameled **steel** distn. system for concn. and purifn. of sulfuric acid)

RN 239101-10-1 HCA
CN Iron alloy, base, Fe 0-78,Cr 13-32,Ni 5-25,Co 0-20,Si 4-9,Mn 0-8,Cu 0-4,W 0-4,Mo 0-3,Nb 0-2,Ta 0-2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	0 - 78	7439-89-6
Cr	13 - 32	7440-47-3
Ni	5 - 25	7440-02-0
Co	0 - 20	7440-48-4
Si	4 - 9	7440-21-3
Mn	0 - 8	7439-96-5
Cu	0 - 4	7440-50-8
W	0 - 4	7440-33-7
Mo	0 - 3	7439-98-7
Nb	0 - 2	7440-03-1
Ta	0 - 2	7440-25-7
C	0 - 0.1	7440-44-0

IC ICM C01B017-88
CC 49-2 (Industrial Inorganic Chemicals)
Section cross-reference(s): 47, 55
IT Distillation columns
Evaporators
Oxidizing agents
Packed columns and towers
(enameled **steel** distn. system for concn. and purifn. of sulfuric acid)
IT Heat exchangers
(tubular; enameled **steel** distn. system for concn. and purifn. of sulfuric acid)
IT 216005-72-0 **239101-10-1** 239101-11-2 239101-12-3
(enameled **steel** distn. system for concn. and purifn. of sulfuric acid)
IT 7664-93-9P, Sulfuric acid, preparation
(enameled **steel** distn. system for concn. and purifn. of sulfuric acid)
IT 7697-37-2, Nitric acid, uses 7782-44-7, Oxygen, uses 7782-78-7, Nitrosyl sulfuric acid
(oxidizing agent; enameled **steel** distn. system for concn. and purifn. of sulfuric acid)

L148 ANSWER 13 OF 21 HCA COPYRIGHT 2003 ACS
131:21689 Cast **steel** having high resistance to thermal fatigue under restricted condition and oxidation. Chibana, Fukumatsu; Uno, Tetsuo (Kawamura Stainless Kogyo Y. K., Japan; Asahi Tech K. K.). Jpn. Kokai Tokkyo Koho JP 11140600 A2 19990525 Heisei, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-325441 19971111.
AB The cast Fe alloy contains C 0.01-0.2, Si 3.0-5.0, Mn 0.5-2.5, Cr 6.0-14.5, Ni 6.0-11.5, Mo 0.05-2.0, Nb 0.05-2.5, W 0.05-2.0, and Cu 0.5-2.0 or N 0.05-0.15%. The low Cr and Ni contents of the alloy

decreases cost for manuf., and the appropriate amt. of Si improves castability.

IT **226090-33-1**
(cast iron alloys having high resistance to thermal fatigue under restricted condition and oxidn.)

RN 226090-33-1 HCA

CN Iron alloy, base, Fe 58-84,Cr 6-14,Ni 6-12,Si 3-5,Mn 0.5-2.5,Nb 0-2.5,Cu 0.5-2,Mo 0-2,W 0-2,C 0-0.2 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	58	-	84	7439-89-6
Cr	6	-	14	7440-47-3
Ni	6	-	12	7440-02-0
Si	3	-	5	7440-21-3
Mn	0.5	-	2.5	7439-96-5
Nb	0	-	2.5	7440-03-1
Cu	0.5	-	2	7440-50-8
Mo	0	-	2	7439-98-7
W	0	-	2	7440-33-7
C	0	-	0.2	7440-44-0

IC ICM C22C038-00
ICS C22C038-58

CC 55-3 (Ferrous Metals and Alloys)

ST thermal fatigue resistance cast **steel**; oxidn resistance cast iron alloy

IT 226090-31-9 226090-32-0 **226090-33-1** 226090-34-2
(cast iron alloys having high resistance to thermal fatigue under restricted condition and oxidn.)

L148 ANSWER 14 OF 21 HCA COPYRIGHT 2003 ACS

130:15506 Process for concentration or purification of sulfuric acid. Lailach, Gunter; Savakis, Stylianos; Wurminghausen, Thomas (Bayer A.-G., Germany). Eur. Pat. Appl. EP 876995 A1 19981111, 8 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (German). CODEN: EPXXDW. APPLICATION: EP 1998-107477 19980424. PRIORITY: DE 1997-19719394 19970507.

AB A procedure for concn. or purifn. of a 80-93 wt.% H2SO4 (optionally contg. org. impurities) to a H2SO4 concn. of 95-98 wt.% involves evapn. (with optional addn. of oxidn. agents) at 270-340.degree. and 0.1-2 bar (preferably at at 0.5-1.1 bar). Evapn. is done on austenitic-ferritic or austenitic **steel** heat treatment surfaces. Prior to the concn. and/or purifn. process, the heat treatment surfaces are passivated by treatment with (1) a 95-98% H2SO4 for .gtoreq.24 h at 250-340.degree. and a pressure sufficient to prevent boiling, (2) a 95-98% H2SO4 contg. .gtoreq.100 ppm (preferably 500-5,000 ppm) nitrosylsulfuric acid (as N2O5) for .gtoreq.12 h at 250-340.degree. and a pressure sufficient to prevent boiling, or (3) a 95-100% HNO3 for .gtoreq.12 h at 70-90.degree. and

a pressure sufficient to prevent boiling.

IT **216005-70-8**
(heat transfer surfaces in concn. or purifn. of sulfuric acid)

RN 216005-70-8 HCA

CN Iron alloy, base, Fe 0-78,Cr 13-32,Ni 5-25,Co 0-20,Si 4-9,Mn 0-8,Cu 0-4,W 0-4,Mo 0-3,Nb 0-2,Ta 0-2,N 0-0.2,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	0 - 78	7439-89-6
Cr	13 - 32	7440-47-3
Ni	5 - 25	7440-02-0
Co	0 - 20	7440-48-4
Si	4 - 9	7440-21-3
Mn	0 - 8	7439-96-5
Cu	0 - 4	7440-50-8
W	0 - 4	7440-33-7
Mo	0 - 3	7439-98-7
Nb	0 - 2	7440-03-1
Ta	0 - 2	7440-25-7
N	0 - 0.2	17778-88-0
C	0 - 0.1	7440-44-0

IC ICM C01B017-80
ICS C01B017-88; C01B017-90; B01J019-02; C22C038-40

CC 49-2 (Industrial Inorganic Chemicals)
Section cross-reference(s): 55

IT **216005-70-8** 216005-71-9 216005-72-0
(heat transfer surfaces in concn. or purifn. of sulfuric acid)

L148 ANSWER 15 OF 21 HCA COPYRIGHT 2003 ACS

126:10414 Manufacture of superfine microstructural **steel** products. Aihara, Kenji (Sumitomo Metal Ind, Japan). Jpn. Kokai Tokkyo Koho JP 08246049 A2 19960924 Heisei, 11 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1995-45800 19950306.

AB The products having av. grain size .ltoreq.2 .mu.m are manufd. by heating a **steel** contg. C .ltoreq.2.50, Al .ltoreq.2.00, Mn 1.0-10, and (A) Ni .ltoreq.10, Cu .ltoreq.3.0, Cr .ltoreq.27, and/or N 0.01-0.20, and/or (B) Ti .ltoreq.3.0, Nb .ltoreq.3.0, V .ltoreq.5.0, Mo .ltoreq.5.0, W .ltoreq.10, and/or Co .ltoreq.10 wt.% from a temp. lower than Ac1 to higher than Ac1 with plastic working at strain .gtoreq.20%; then cooling to room temp. Alternatively, the products are manufd. by heating the **steel** at a temp. higher than Ac1; cooling the **steel**; aging the supersatd. solid soln. structure-having **steel** at 673-973 K; heating from a temp. lower than Ac1 to higher than Ac1 at heating speed .gtoreq.10 K/s with plastic working at strain .gtoreq.20%; then cooling to room temp.

IT **184159-77-1**
(temp.-controlled heat treatment in manuf. of superfine

microstructural **steel** product)

RN 184159-77-1 HCA
CN Iron alloy, base, Fe 9.3-99,Cr 0-27,Mn 1-10,Co 0-10,Ni 0-10,W 0-10,Mo 0-5,V 0-5,Cu 0-3,Nb 0-3,Ti 0-3,C 0-2.5,Al 0-2,N 0-0.2 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	9.3 - 99	7439-89-6
Cr	0 - 27	7440-47-3
Mn	1 - 10	7439-96-5
Co	0 - 10	7440-48-4
Ni	0 - 10	7440-02-0
W	0 - 10	7440-33-7
Mo	0 - 5	7439-98-7
V	0 - 5	7440-62-2
Cu	0 - 3	7440-50-8
Nb	0 - 3	7440-03-1
Ti	0 - 3	7440-32-6
C	0 - 2.5	7440-44-0
Al	0 - 2	7429-90-5
N	0 - 0.2	17778-88-0

IC ICM C21D008-02
ICS C22C038-00; C22C038-52; C22C038-58
CC 55-5 (Ferrous Metals and Alloys)
ST **steel** superfine microstructure heat treatment
IT 184159-55-5, processes 184159-56-6 184159-57-7 184159-58-8
184159-59-9 184159-60-2 184159-61-3 184159-63-5 184159-66-8
184159-67-9 184159-68-0 184159-69-1 184159-71-5 184159-73-7
184159-75-9 **184159-77-1** 184159-79-3 184159-81-7
184159-83-9 184159-86-2 184159-88-4 184159-90-8 184159-92-0
184160-00-7 184160-02-9 184160-04-1 184160-06-3 184160-07-4
184160-08-5 184160-09-6 184160-10-9
(temp.-controlled heat treatment in manuf. of superfine microstructural **steel** product)

L148 ANSWER 16 OF 21 HCA COPYRIGHT 2003 ACS
123:14751 Austenitic stainless **steel** for cast parts having high yield strength and corrosion resistance. Nishi, Koji; Matsushima, Masahiro (Nidatsuku Kk, Japan). Jpn. Kokai Tokkyo Koho JP 07070700 A2 19950314 Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1993-215856 19930831.
AB The stainless **steels** contain C .ltoreq.0.1, Cr 15.0-23.0, Si .ltoreq.2.0, Mn 4.0-15.0, Ni 4.0-10.0, and Mo 0.2-0.4%, optionally with N 0.1-0.4%, Cu .ltoreq.3.0, W .ltoreq.3.0, Co .ltoreq.3.0, Nb .ltoreq.2.0, and/or Ti .ltoreq.0.5%. The stainless **steels** are suitable for cast parts in service under corrosive conditions.
IT **164107-70-4**

(austenitic; stainless **steel** for cast parts having high yield strength and corrosion resistance)
RN 164107-70-4 HCA
CN Iron alloy, base, Fe 38-77,Cr 15-23,Mn 4-15,Ni 4-10,Co 0-3,Cu 0-3,W 0-3,Nb 0-2,Si 0-2,Ti 0-0.5,Mo 0.2-0.4,N 0.1-0.4,C 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	38	-	77	7439-89-6
Cr	15	-	23	7440-47-3
Mn	4	-	15	7439-96-5
Ni	4	-	10	7440-02-0
Co	0	-	3	7440-48-4
Cu	0	-	3	7440-50-8
W	0	-	3	7440-33-7
Nb	0	-	2	7440-03-1
Si	0	-	2	7440-21-3
Ti	0	-	0.5	7440-32-6
Mo	0.2	-	0.4	7439-98-7
N	0.1	-	0.4	17778-88-0
C	0	-	0.1	7440-44-0

IC ICM C22C038-00
ICS C22C038-58
CC 55-3 (Ferrous Metals and Alloys)
ST casting austenitic stainless **steel** strength; manganese stainless **steel** casting strength
IT Cast metals and alloys
(stainless **steels**, austenitic stainless **steel** having high yield strength and corrosion resistance)
IT 163675-19-2 163675-20-5 163675-21-6 163675-22-7 163675-23-8
163675-24-9 163675-25-0 164107-69-1 **164107-70-4**
(austenitic; stainless **steel** for cast parts having high yield strength and corrosion resistance)

L148 ANSWER 17 OF 21 HCA COPYRIGHT 2003 ACS
120:250171 Centrifugal-casted sleeve rolls and their manufacture.
Hashimoto, Tadao; Aranaka, Hiromasa; Myai, Naomichi; Kataoka, Yoshihiro (Kawasaki Steel Co, Japan). Jpn. Kokai Tokkyo Koho JP 05306426 A2 19931119 Heisei, 13 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1992-135730 19920430.
AB The sleeve rolls are manufd. by depositing Fe alloy outer layers, contg. C 1.0-3.5, Si .ltoreq.2.0, Mn .ltoreq.2.0, Cr .ltoreq.12.0, Mo .ltoreq.8.0, V 3.0-10.0 and Nb 0.6-7.0%, on the surfaces of graphite **steel** inner layers, contg. C 1.0-2.0, Si 1.6-2.4, Mn 0.2-1.0, P .ltoreq.0.05, S .ltoreq.0.03, Ni .ltoreq.0.7, Cr .ltoreq.3.5 and Mo .ltoreq.3.0%, to form integrates, resp. Optionally, the outer layers also contain Ni.ltoreq.8.0, Co .ltoreq.10.0, Cu .ltoreq.2.0, Ti .ltoreq.2.0, Zr .ltoreq.2.0, W .ltoreq.1.0 and/or B .ltoreq.0.1%. Preferably, the outer layers

satisfy V + 1.8Nb .ltoreq.7.5C - 6.0%, and 0.2 .ltoreq. Nb/V .ltoreq.0.8. In the process, mixing ratio of the outer layer to the inner layer is controlled at 5-30%. The rolls show wear- and crack resistance, and toughness.

IT **154635-70-8**
(outers from, centrifugal casting of, mixing ratio control in, for sleeve rolls, for toughness and resistances to wear and crack)

RN 154635-70-8 HCA

CN Iron alloy, base, Fe 30-95,Cr 0-12,V 3-10,Co 0-10,Mo 0-8,Ni 0-8,Nb 0.6-7,C 1-3.5,Cu 0-2,Mn 0-2,Si 0-2,Ti 0-2,Zr 0-2,W 0-1,B 0-0.1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	30	-	95	7439-89-6
Cr	0	-	12	7440-47-3
V	3	-	10	7440-62-2
Co	0	-	10	7440-48-4
Mo	0	-	8	7439-98-7
Ni	0	-	8	7440-02-0
Nb	0.6	-	7	7440-03-1
C	1	-	3.5	7440-44-0
Cu	0	-	2	7440-50-8
Mn	0	-	2	7439-96-5
Si	0	-	2	7440-21-3
Ti	0	-	2	7440-32-6
Zr	0	-	2	7440-67-7
W	0	-	1	7440-33-7
B	0	-	0.1	7440-42-8

IC ICM C22C037-00
ICS B21B027-00; B22D013-02; B32B015-01; C22C037-06; C22C038-00; C22C038-12

CC 55-2 (Ferrous Metals and Alloys)

ST sleeve roll centrifugal casting **steel**; iron sleeve roll centrifugal casting

IT Rolls
(sleeve, contg. iron alloy outer- and graphite **steel** inner layers, centrifugal casting of, mixing ratio control in, for toughness and resistance to wear and crack)

IT 153421-39-7 154537-82-3 154537-84-5 **154635-70-8**
(outers from, centrifugal casting of, mixing ratio control in, for sleeve rolls, for toughness and resistances to wear and crack)

L148 ANSWER 18 OF 21 HCA COPYRIGHT 2003 ACS

104:228585 Iron alloy electrode for mannual arc welding, substitution of chromium and nickel. Fluckiger, Jean Louis (Braslab Desenvolvimento Pesquisa e Tecnologia Ltda., Brazil). Braz. Pedido PI BR 8402453 A 19851224, 15 pp. (Portuguese). CODEN: BPXXDX. APPLICATION: BR

1984-2453 19840517.

AB Fe alloy with partially substituted Cr contains C .ltoreq.1, Si .ltoreq.1, Mn 8-16, Cr .ltoreq.5, Ni 2-10, Cu .ltoreq.2, Nb .ltoreq.2, and Mo .ltoreq.5%. Fe alloy with partially substituted Ni contains C .ltoreq.0.2, Si 0.2-1.5, Mn 8-16, Cr 5.0-15, Ni .ltoreq.5, Cu .ltoreq.2, Nb .ltoreq.2, Mo .ltoreq.5, P .ltoreq.0.04, and Si .ltoreq.0.04%. When both Cr and Ni are replaced, the Fe alloy contains C 0.0-0.5, Si 2.0-3.5, Mn .ltoreq.27, and Al 2-4%. Thus, the Fe alloys were used in maintenance welding of C **steel** excavation buckets for mining, and of Mn **steel** or C **steel** plates on bucket interior. After 3 mo of service, no fractures or cracks were found in the welds.

IT **102485-23-4**
(welding electrodes from, for excavator bucket repair)

RN 102485-23-4 HCA

CN Iron alloy, base, Fe 53-87,Mn 8-16,Cr 5-15,Mo 0-5,Ni 0-5,Cu 0-2,Nb 0-2,Si 0.2-1.5,C 0-0.2 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	53	-	87	7439-89-6
Mn	8	-	16	7439-96-5
Cr	5	-	15	7440-47-3
Mo	0	-	5	7439-98-7
Ni	0	-	5	7440-02-0
Cu	0	-	2	7440-50-8
Nb	0	-	2	7440-03-1
Si	0.2	-	1.5	7440-21-3
C	0	-	0.2	7440-44-0

IC ICM B23K035-22
ICS C22C038-58

CC 55-9 (Ferrous Metals and Alloys)
Section cross-reference(s): 54

IT 102485-22-3 **102485-23-4** 102485-24-5
(welding electrodes from, for excavator bucket repair)

L148 ANSWER 19 OF 21 HCA COPYRIGHT 2003 ACS

104:72890 **Steels** for flux-cored welding wires. Kudo, Masao; Ito, Tadashi; Sakabe, Keiichi (Sumikin Welding Electrode Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 60180694 A2 19850914 Showa, 10 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1984-35661 19840227.

AB **Steels** as sheaths for coring a welding flux to develop work-hardening and wear-resistant welds contain C 0.6-1.5, Si <1, Mn 13-25, Cr 13-25, optionally with Ni <5 and/or Cu <2, and/or .gtoreq.1 of V <2.5, Nb <3, and Mo <3%. Thus, a SM41 **steel** plate was buildup welded with a bottom layer of SUS 309 beneath 2 **steel** layers at 400 A, 28 V, 40 cm/min, and <150.degree. between passes. When using flux-cored wires of **steel** contg. C 0.85, Si 0.3, Mn 21, and Cr 16.5%, **steel** layers

contg. C 0.7, Si 0.57, Mn 17.8, P 0.014, S 0.01, and Cr 15.8% were formed. The layers had Vickers hardness 268, yield point and tensile strength 60.9 and 93.9 kg/mm2, elongation 25.2%, and impact value 5 kg/m.

IT **100310-02-9**
(welding buildup with flux-cored wire of, for work hardening and wear resistance)

RN 100310-02-9 HCA

CN Iron alloy, base, Fe 40-73,Cr 13-25,Mn 13-21,Ni 0-5,Nb 0-3,V 0-2.5,Cu 0-2,C 0.6-1.5,Si 0.1-1,Mo 0-1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	40	-	73	7439-89-6
Cr	13	-	25	7440-47-3
Mn	13	-	21	7439-96-5
Ni	0	-	5	7440-02-0
Nb	0	-	3	7440-03-1
V	0	-	2.5	7440-62-2
Cu	0	-	2	7440-50-8
C	0.6	-	1.5	7440-44-0
Si	0.1	-	1	7440-21-3
Mo	0	-	1	7439-98-7

IC ICM B23K035-368
ICS B23K035-30

CC 55-9 (Ferrous Metals and Alloys)

ST flux cored **steel** welding; buildup welding **steel**

IT Welding
(building-up, flux-cored alloy **steel** wire for)

IT 37268-90-9, uses and miscellaneous 51280-84-3, uses and miscellaneous
(welding buildup of, flux-cored alloy **steel** wires for)

IT 11109-52-7 100310-01-8 **100310-02-9**
(welding buildup with flux-cored wire of, for work hardening and wear resistance)

IT 12725-28-9
(welding buildup with, beneath alloy **steel** layers for work hardening and wear resistance)

L148 ANSWER 20 OF 21 HCA COPYRIGHT 2003 ACS

95:47199 **Steel** for use in making grinding apparatus. (Acieries Thome-Cromback, Fr.). Belg. BE 881593 19800807, 12 pp. (French). CODEN: BEXXAL. APPLICATION: BE 1980-199301 19800207.

AB The heat treatment to produce austenitic or martensitic structure in **steel** for grinding app. involves the partial cooling of the hot bloom by direct air blowing, followed by quenching. The **steel** [**78193-14-3**] with M3C or M7C3 carbide structure contains C 1-4, Cr 0-40, Mo 0-2, Si 0.1-2.5, Mn 0.1-15, V 0-5, Cu 0-5, Mg 0-1, W 0-5, Ni 0-5, B 0-2, and Nb 0-2.

IT **78193-14-3**

(heat treatment of austenitic or martensitic, for grinding app.)
RN 78193-14-3 HCA
CN Iron alloy, base, Fe 16-99,Cr 0-40,Mn 0.1-15,Cu 0-5,Ni 0-5,W 0-5,C 1-4,Si 0.1-2.5,B 0-2,Mo 0-2,Nb 0-2,Mg 0-1 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	16	-	99	7439-89-6
Cr	0	-	40	7440-47-3
Mn	0.1	-	15	7439-96-5
Cu	0	-	5	7440-50-8
Ni	0	-	5	7440-02-0
W	0	-	5	7440-33-7
C	1	-	4	7440-44-0
Si	0.1	-	2.5	7440-21-3
B	0	-	2	7440-42-8
Mo	0	-	2	7439-98-7
Nb	0	-	2	7440-03-1
Mg	0	-	1	7439-95-4

IC B02C; B22D; C21D
CC 55-5 (Ferrous Metals and Alloys)
ST heat treatment **steel** grinding app
IT Size reduction apparatus
(heat-treatment of **steel** for)
IT **78193-14-3**
(heat treatment of austenitic or martensitic, for grinding app.)

L148 ANSWER 21 OF 21 HCA COPYRIGHT 2003 ACS
79:22492 Corrosion-resistant stainless **steel**. Yokota, Kozo; Fukase, Yukishige; Chizawa, Koichiro; Ito, Joichi (Nippon Yakin Kogyo Co., Ltd.). Jpn. Tokkyo Koho JP 47008689 B4 19720313 Showa, 12 pp. (Japanese). CODEN: JAXXAD. APPLICATION: JP 1968-22801 19680408.
AB The age-hardenable stainless **steels** contain C <0.15, Si <2.5, Mn <3, Ni 1.5-8. Cr 16-23, Mo 1-o, Cu 1.5-4, and optionally Al, Be, Nb, Sn, Ti, and(or) Zr 0.03-2% with a ferrite-austenite mixed texture for manufg. large chem. plant app.
IT **39351-22-9**
(age-hardenable austenitic-ferritic, for chem. industry)
RN 39351-22-9 HCA
CN Iron alloy, base, Fe 41-80,Cr 16-23,Ni 1.5-8,Mo 1-6,Cu 1.5-4,Mn 0-3,Si 0-2.5,Al 0-2,Be 0-2,Nb 0-2,Sn 0-2,Ti 0-2,Zr 0-2,C 0-0.2 (9CI) (CA INDEX NAME)

Component	Component Percent			Component Registry Number
Fe	41	-	80	7439-89-6
Cr	16	-	23	7440-47-3
Ni	1.5	-	8	7440-02-0